MASTER DEVELOPMENT DRAINAGE PLAN FOR OVERALL DUBLIN NORTH SUBDIVISION AND FINAL DRAINAGE REPORT FOR FILING No. 1 COLORADO SPRINGS, COLORADO

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ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

COLORADO REGISTERED QUENTIN N. AD 37 PROFESSIONAL ENGINEER

Name Seal

Developer's Statement:

I, the developer have read and will comply with all of the requirements specified in this drainage report and plan.

Dublin Holdings Group, LLC
Business Name

By:

Title: CONSTRUCTION MANAGER

Address: 25 N Tejon Street Colorado Springs, CO

City of Colorado Springs:

Filed in accordance with Section 7-7-906 of the Code of the City of Colorado Springs, 2001, as amended.

For City Engineer

2/6/08
Date

Conditions

MASTER DEVELOPMENT DRAINAGE PLAN FOR OVERALL DUBLIN NORTH SUBDIVISION AND FINAL DRAINAGE REPORT FOR FILING No. 1 COLORADO SPRINGS, COLORADO

PURPOSE

The purpose of this drainage report is to identify and analyze the proposed drainage patterns, determine proposed runoff quantities, size and type of drainage structures for conveyance of developed runoff, and present solutions to drainage impacts on-site and off-site resulting from this development.

GENERAL DESCRIPTION

This MDDP/Final Drainage Plan consists of approximately 42 acres. The site is currently platted in El Paso County as AA Subdivision and consists of Lots 7, 8, 9, 10, and 11 off of Vickie Lane. This site is currently being annexed into the City of Colorado Springs. This site is to be developed as Dublin North Subdivision in several different Filings and will consist of single family and multi family lots with some open space for drainage. At this time the eastern 10.00 acres is going to be platted as "Dublin North Filing No. 1." The site is located in a portion of Section 7, Township 13 South, Range 65 West of the 6th Principal Meridian currently within El Paso County, Colorado. The entire site is bounded to the west by the remaining lots in the AA Subdivision, which is now owned by the owner of Dublin North. To the north is un-platted county land currently being annexed for a school site and open space. To the south is Dublin Boulevard, and to the east is Greenhaven Filing No. 2 residential subdivision.

The site is contained within the Sand Creek Basin. Flows from this site are tributary to Sand Creek.

Soils for this project are delineated by the map in the appendix as Blakeland loamy sand (8). Soils in the study area are shown as mapped by S.C.S. in the "Soils Survey of El Paso County Area" and are primarily of Hydrologic Group A. The study area consists of large lot residential development with existing natural, grasses and native vegetation. A ridge splits the site with the eastern half of the existing topography sloping from the northwest to the southeast with slopes ranging from 2% to

33%. The western half slopes from the northeast to the southwest ranging from 2% to 33%.

FLOODPLAIN STATEMENT

No portion of this site is within a designated F.E.M.A. floodplain, as determined by Flood Insurance Rate Map No. 08041C0537 F dated March 17, 1997 (see appendix).

EXISTING DRAINAGE CONDITIONS

Part of this site was most recently studied in the "Greenhaven Filing No. 1 and 2 Preliminary/ Final Drainage Report," and was also studied in the "Master Development Drainage Plan Amendment No. II for the Easterly Portion of Ridgeview Subdivision and Preliminary Drainage Report for the Northeasterly Portion of Ridgeview Subdivision and Phase II Sand Creek Channel Improvements" (MDDP Amend II) by JR Engineering dated February 2004. The site was originally studied in the "Sand Creek Drainage Basin Planning Study Preliminary Design Report" (DBPS) prepared by Kiowa Engineering.

In the previously mentioned study for Greenhaven there were three discharge points along the western boundary. These same discharge points were re-analyzed and as shown below were within their assumed offsite runoff for the Historic Condition. There were a total of 7 offsite discharge points that were analyzed for comparison to the developed runoff. Below is a description of these discharge points.

Design Point EX-1 is at the east boundary of site. Basin EX-A's 18.06 acres and offsite Basin OS-1's 8.18 acres are part of Basin OS-145-2 from the MDDP. The composite C values for these offsite basins were taken from the above mentioned MDDP Amend II. If these upstream basins change in the future they will need to release their runoff at or below the rates calculated in this report. Runoff (Q_5=35.5 cfs and Q_{100}=75.7 cfs) is routed by swales and berms into The Greenhaven Filing No. 2 storm drain system. These flows are in conformance with the previously mentioned MDDP Amend II and FDR for Greenhaven flows (Q_5=38 cfs and Q_{100}=81 cfs).

Design Point EX-2 is at the north end of the eastern boundary. Basin EX-B's 0.58 acres and offsite Basin OS-2's 1.93 acres are part of Basin OS-145-3 from the MDDP. The composite C

values for these basins were taken from the above mentioned MDDP Amend II, which accounted for the development of a proposed high school. Runoff (Q_5=5.2 cfs and Q_{100}=9.3 cfs) sheet flows into a channel installed with Greenhaven Subdivision and then is routed east to a storm drain system in Black Forest Road. The flows from the MDDP Amend II for Basin OS- 145-3 were calculated to be Q_5=140 cfs and Q_{100}=258 cfs, which can not be compared to Dublin 1 due to the insignificant area of EX-2's area.

Design Point EX-3 is at the south end of the eastern boundary. Basin EX-C's 10.61 acres is part of Basin OS-145-1 from the MDDP Amend II. The composite C values for this basin was taken from the MDDP Amend II. In the original MDDP Amend II the calculated runoff was Q_5=20.0 cfs and Q_{100}=41.0 cfs. The calculated runoff (Q_5=17.7 cfs and Q_{100}=35.8 cfs) is routed by a channel into The Greenhaven Filing No. 2 storm drain system and then is routed east to a storm drain system in Black Forest Road.

Design Point EX-4 is at the southern boundary. Basin EX-D's 1.27 acres consists of the small area tributary to Dublin Blvd. Runoff (Q_5=1.5 cfs and Q_{100}=3.3 cfs) sheet flows south offsite into Dublin Blvd and then is routed by curb and gutter east to a storm drain system in Dublin Blvd near Black Forest Road.

Design Point EX-5A is also at the southern boundary. Basin EX-E1's 0.62 acres consists of the small area tributary to Dublin Blvd. Runoff (Q_5=0.7 cfs and Q_{100}=1.6 cfs) sheet flows south offsite into Dublin Blvd and then is routed west by curb and gutter and is captured in the street drainage system.

Design Point EX-5B is also at the southern half of the western boundary of the site. Basin EX-E2's 2.17 acres consists of large lot development that sheet flows west offsite. Runoff (Q_5=2.2 cfs and Q_{100}=5.1 cfs) is directed into Dublin Blvd and then is routed by curb and gutter west and is captured in the street drainage system.

Design Point EX-6 is also at the northern half of the western boundary of the site. This Design Points Boundary is the actual Boundary being used for the Development Plan. Basin EX-F's

3.69 acres consists of large lot development that sheet flows southwest offsite. Runoff (Q_5=3.7 cfs and Q_{100}=8.4 cfs) is directed into Dublin Blvd and then is routed by curb and gutter west and is captured in the street drainage system.

Design Point EX-7 is the area on the west side of the site. Basin EX-G's 4.87 acres consists of large lot development. Runoff (Q_5=5.5 cfs and Q_{100}=12.7 cfs) sheet flows southwest offsite.

Design Point EX-8 is the combined runoff (Q_5=8.7 cfs and Q_{100}=19.6 cfs) of Design Points EX-6 & EX-7 at the west boundary of the proposed future site. This was analyzed so we can detain to historic conditions once the annex has taken place. As mentioned above the owner of this site has an option on purchasing the downstream property. It was planned that the detention of this area would be incorporated with the downstream property at the time of final platting for this area. As of right now the client is looking at possibly changing the land use of Basin EX-G and part of EX-F to multi family. It is the owner's request that we either detain downstream on the property under option with a regional pond for surrounding areas or incorporate a detention pond in the new layout. There is more discussion on this under proposed conditions for Basin F and G. This will be addressed in the Final Drainage Report for Filings 3, 4, and 5, as final design decisions are made.

PROPOSED DRAINAGE CONDITIONS

The Dublin North Subdivision is part of the "Master Development Drainage Plan Amendment No. II for the Easterly Portion of Ridgeview Subdivision and Preliminary Drainage Report for the Northeasterly Portion of Ridgeview Subdivision and Phase II Sand Creek Channel Improvements" (MDDP Amend II) by JR Engineering dated February 2004. The proposed site was part of Basins OS-145-1, OS-145-2 and OS-145-3. As mentioned in the existing conditions these basins were analyzed in this report and the calculated historic flows will be used as the allowable release rates for the developed condition. The developed design points correspond to existing discharge points.

The offsite basins have been calculated using a composite C value based upon assumed land uses per the MDDP Amend II mentioned above. These land uses are based upon 5 acre single family development or "ranchette" as called in the MDDP Amend II and a small area of school site. If these

land uses later change and have an increase in runoff due to a change in impervious area these upstream owners will need to restrict flow to the runoff calculated here in this report and the above mentioned MDDP Amend II report.

Per the Development Plan the site will be developed in 5 filings. The site grading will be done in two phases. The initial phase occupies the easterly portion of the site as defined on the Proposed Drainage Map as Phase 1. The remainder of the site will be graded in Phase 2. A Temporary Water Quality Detention Pond (WQDP) located just west of Design Point 1A has been added to the plan within the area to be graded later. Once Phase 2 grading has been started, the Temporary WQDP will be removed.

In order to treat the historic overland flows from the west and north, which would find their way to the inlets at DP-1A and DP-1B, a proposed temporary Water Quality Capture Pond (WQC) is to be installed with the Phase 1 site grading to be located just west of the inlet at DP-1A. The pond has been configured to detain approximately 14 acres of watershed area from the historic basin EX-A not graded at his time and from offsite Basin OS-1. Per the Extended Detention Basin (EDB) worksheet (see appendix), a WQCV of 0.212 acre-feet is required. The average storage volume from elevation 6834.00 to elevation 6840.00 is 1.556 acre-ft. This is oversized in order to assure that as much storm water volume as possible is treated before entering the Filing No. 1 Storm Drain. The top elevation of the pond at 6840.00 is two feet above the top elevation of 6838.00 of the proposed temporary 36" CMP standpipe. The temporary standpipe with two rows of 6 - 0.5" diameter holes (per the Extended Detention Basin worksheet (see appendix & map) will be installed within the WQC pond to control the outflow of captured storm water. The standpipe will connect to the back of the inlet at DP-1A with a temporary 36" CMP. When the grading of this site goes beyond this temporary WQC pond, this pond and standpipe configuration will be removed and the hole at the back of the inlet will be sealed per standard practices.

The following are descriptions of the onsite basins, and the overall proposed drainage characteristics for the development of Dublin North Subdivision. Please note that this information is preliminary in nature for the future 4 filings and should be confirmed at the time of the final drainage report. Only Filing No. 1 is being Final designed.

Design Point 1A is a low point where the combined runoff (Q_5=19.5 cfs and Q_{100}=37.9 cfs) of Basins A1 (4.69 ac), A2 (2.58 ac), A3 (3.28 ac), and OS-1B (0.12 ac) is captured by a 10' D10-R sump inlet. Pipe Run 1 a 24" RCP transports the runoff to DP-1B. At Design Point 1B, the runoff (Q_5=2.3 cfs and Q_{100}=4.5 cfs) from Basin A4 (1.05 ac) is combined with the runoff from DP-1A. The flow is assumed to be split between 2-10' D10-R sump inlets at DP-1A and DP-1B, the total flow split between 2-10' sump inlets is Q_5=21.4 cfs and Q_{100}=41.7 cfs. Pipe Run 2 a 30" RCP then transports the combined flow east DP-1D, a 10' D10-R sump inlet in Donahue Drive.

Design Point 1C is point at the north boundary where runoff (Q_5=11.0 cfs and Q_{100}=23.5 cfs) from Basin OS-1A (8.14 ac) enters the site. A trapezoidal swale (Section A-A) with a 2' bottom and 4:1 side slopes at a depth of 2' will transport the flow south toward Public Detention Pond 1.

Design Point 1D is a low point where the runoff (Q_5=10.9 cfs and Q_{100}=21.7 cfs) of Basins A5 (5.05 ac) is captured by a 10' D10-R sump inlet. Pipe Run 3, a 36" RCP, transports the runoff to DP-1E.

At Design Point 1E, the runoff (Q_5=2.2 cfs and Q_{100}=4.4 cfs) from Basin A6 (1.03 ac) is captured by a 6' D10-R sump inlet. Pipe Run 4 a 36" RCP transports the combined runoff (Q_5=13.2 cfs and Q_{100}=26.2 cfs) from DP-1D and DP-1E runoff to a storm manhole (STMH-1).

Runoff (Q_5=2.9 cfs and Q_{100}=5.7 cfs) from Basin A8 (1.25 ac) is routed to 20' D10-R at-grade inlet (DP-1F). The inlet captures Q_5=2.1 cfs and Q_{100}=3.7cfs. Pipe Run 5, an 18" RCP, transports the runoff to a junction with Pipe Run 4. Pipe Run 6, a 42" RCP, then transports the combined flow (Q_5=34.7 cfs and Q_{100}=67.0 cfs) of Pipe runs 4 and 5 to Detention Pond 1. The flow-by (Q_5=0.8cfs and Q_{100}=2.0cfs) from DP-1F will go down Crestdale Drive and into Grenhaven's storm system. Being the author and familiar of The Greenhaven Filing No. 2 Final Drainage Report, the small amount of flow-by is not anticipated to negatively affect the existing downstream storm system.

At Design Point 1G the combined runoff (Q_5=44.7 cfs and Q_{100}=88.7 cfs) from Basins A1 thru A8 and OS-1A thru OS-1C is routed through a proposed Water Quality and Public Detention Pond 1. This combined runoff is more than the allowable historic condition release rate. Per the historic

Conditions at DP-EX1, the allowable release rate is Q_5=35.5 cfs and Q_{100}=75.7 cfs. In order to limit the number of ponds and associated maintenance issues, Pond 1 will over-detain to account for the increase at Design Points 1G (Pond 1) and 3M (Pond 2) in the developed condition. Per the historic Conditions at DP-EX3 the runoff rate is Q_5=17.7 cfs and Q_{100}=35.8 cfs. In the developed condition the runoff rate is (Q_5=22.4 cfs and Q_{100}=44.9 cfs) at DP-3M (Pond 2). This is an increase of Q_5=4.8 cfs and Q_{100}=9.2 cfs and will be subtracted from the historic allowable release rates of Q_5=35.5 cfs and Q_{100}=75.7 cfs at Pond 1 for a new historic release rate of Q_5=30.7 cfs and Q_{100}=66.6 cfs.

At Detention Pond 1 a two stage inlet riser will act as the outlet structure. The first inlet, a 3' x 3', is set at Grate Elevation of 6790.00, which is 4' higher than the bottom of pond to account for water quality volume and will pass the 5-year event. The second inlet, a 3' x 3', is set at Grate Elevation 6792.00 and will pass the 100 year event. The pond was modeled in Pond Pack with a top of pond elevation at 6796.00. The results were that in the 5-year event the release is 27.85 cfs with a ponding depth of 6791.66. The 100-year results are a release of 61.9 cfs at a ponding depth of 6793.17. The release rates are below the allowable and account for the undetained release of Basin A9 at DP-1H and the flow by of DP-1F. A 42" RCP will transport the flow to the existing 12' inlet in Greenhaven north of Crestdale Drive. A 36" CMP riser with a grate set at an elevation of 6793.50 will act as an emergency outlet in case of clogging in the 3'x3' grates. A riprap armored 30' emergency weir set at 6795.00 is also installed and will safely pass the 100-year developed flow to the swale in Greenhaven and allow it to be picked up in the 12' inlet.

Design Point 1-H is at the existing 8' inlet in Greenhaven Filing No. 2 where the combined runoff (Q_5=4.6 cfs and Q_{100}=10.3 cfs) from Basin A9 (1.24 ac) will sheet flow offsite and then be directed by a swale and berm in Greenhaven north to the existing inlet along the south side of Crestdale Drive. The flow by (Q_5=0.8 cfs and Q_{100}=2.0 cfs) from DP-1F is routed down Crestdale Drive. The overall flow (Q_5=32.5 cfs and Q_{100}=72.2 cfs) entering Greenhaven system from DP-1H and the pond release is less then the historic flow calculated in the MDDP Amend II (Q_5=38 cfs and Q_{100}=81 cfs) and designed for in Greenhaven's storm drain system.

Design Point 2 corresponds to Historic DP EX-2. Runoff (Q_5=4.5 cfs and Q_{100}=8.5 cfs) from Basin B (0.43 ac) and OS-2 (1.93 ac) sheet flows into the existing channel on Greenhaven's property and

follows its historic path offsite in a ditch north of Greenhaven Filing No. 2 to the east and Black Forest Road. Developed runoff is less then the allowable historic (Q_5=5.2 cfs and Q_{100}=9.3 cfs) based upon on Basin B being slightly smaller in the developed condition then the historic.

Design Point 3A is a low point in the multi-family site where the runoff (Q_5=1.3 cfs and Q_{100}=2.7 cfs) from Basin C1 (0.46 ac) is captured by a Type 13 area drain. Pipe Run 7, an 18" RCP, transports the runoff to DP-3B.

At Design Point 3B, the runoff (Q_5=0.8 cfs and Q_{100}=1.5 cfs) from Basin C2 (0.31 ac) is captured by a Type 13 area drain. Pipe Run 8, an 18", RCP transports the runoff to a junction with Pipe Run 11.

Design Point 3C is a low point in a multi-family site where the runoff (Q_5=1.2 cfs and Q_{100}=2.6 cfs) from Basin C3 (0.47 ac) is captured by a Type 13 area drain. Pipe Run 9, an 18" RCP, transports the runoff to a junction with Pipe Run 10.

Design Point 3D is a low point in the drive of the multi-family site where the runoff (Q_5=1.5 cfs and Q_{100}=3.2 cfs) from Basin C4 (0.56 ac) is captured by a Type 13 area drain. Pipe Run 10, an 18" RCP, transports the runoff to a junction with Pipe Run 9. Pipe Run 11 (18" pipe) transports the combined (Q_5=3.3 cfs and Q_{100}=6.8 cfs) flow of Pipe Run 9 and 10 to DP-3E.

At Design Point 3E, the runoff (Q_5=1.9 cfs and Q_{100}=3.9 cfs) from Basin C5 (0.76 ac) is captured by a Type 13 area drain. Pipe Run 12, a 24" RCP, then routes the combined runoff (Q_5=6.3 cfs and Q_{100}=12.8 cfs) of DP-3E and Pipe Runs 8 and 11 to a junction with Pipe Run 15.

At Design Point 3F a low point in the multifamily drive, 2-6' sump inlets will capture the runoff (Q_5=7.3 cfs and Q_{100}=14.8 cfs) from Basin C6 (3.02 ac). Pipe Run 13, an 18" RCP, transports the runoff from one inlet to a junction with Pipe Run 14, an 18" RCP, routing the runoff from the other 6' sump inlet. Pipe Run 15, a 24" RCP, carries the combined flow from Pipe Runs 13 and 14 to a junction with Pipe Run 12.

Design Point 3G is a low point in a multi-family site where the runoff (Q_5=0.2 cfs and Q_{100}=0.4 cfs)

from Basin C7 (0.08 ac) is captured by a Type 13 area drain. Pipe Run16, a 30" RCP, transports the runoff of DP-3G and Pipe Runs 12 and 15 to a junction with Pipe Run 19.

At Design Point 3H a low point in the street section, a 6' sump inlets will capture the runoff (Q_5=4.1 cfs and Q_{100}=8.4 cfs) from Basin C8 (1.63 ac). Pipe Run 17, an 18" RCP, transports the runoff to a junction with Pipe Run 18.

At Design Point 3I a low point in the street section, a 6' sump inlets will capture the runoff (Q_5=0.6 cfs and Q_{100}=1.1 cfs) from Basin C9 (0.24 ac). Pipe Run 18, an 18" RCP, transports the runoff to a junction with Pipe Run 17. Pipe Run 19, an 18" RCP, routes the combined flow (Q_5=4.5 cfs and Q_{100}=9.0 cfs) from Pipe Runs 17 and 18 south to a junction with Pipe Run 16. Pipe Run 20 a 30" RCP transports the combined runoff (Q_5=18.0 cfs and Q_{100}=36.4 cfs) of Pipe Runs 16 and 19 south to a 4' storm manhole No. 2 (STMH-2) and Pipe Run 21.

Design Point 3J is a low point in a multi-family site where the runoff (Q_5=0.2 cfs and Q_{100}=0.4 cfs) from Basin C10 (0.08 ac) is captured by a Type 13 area drain. Pipe Run 21, an 18" RCP, transports the runoff of DP-3J to a junction with 48" round storm manhole, STMH-2. Pipe Run 22, a 30" RCP, will route the combined flow (Q_5=18.2 cfs and Q_{100}=36.8 cfs) of Pipe Runs 20 and 21 east to Design Point 3K.

At Design Point 3K a low point in the cul-de-sac, a 6' sump inlets will capture the runoff (Q_5=3.3cfs and Q_{100}=6.6 cfs) from Basin C11 (1.47 ac). Pipe Run 23, a 30" RCP, discharges the runoff From Pipe Run 22 and DP-3K into a proposed water quality pond located in the open space of Tract C. The water quality pond has been sized based upon the Design Procedure Form for the Extended Detention Basin (see appendix). It is proposed that a 4'x4' outlet structure will pass the runoff east through a 30" RCP (Pond Outlet 2) and into the existing 8' sump inlet located in Greenhaven Filing No. 2. In case of overtopping the runoff will be directed overland to the existing 8' sump inlet.

Basin C12's 0.91 acres consists of the open space and the proposed Water Quality Pond (Pond 2). Runoff (Q_5=2.3 cfs and Q_{100}=4.8 cfs) sheet flow into the pond.

At Design Point 3M the combined runoff (Q_5=22.4 cfs and Q_{100}=44.9 cfs) from Basins C1 through C12 is routed through proposed Public Water Quality Pond 2. The top of the pond is set at 6828. Pond 2 is equipped with a 4' x 4' grated storm inlet set at 6826.50. A trash rack and orifice plate with 2 columns of 0.5" holes in 6 rows will route the minor events while providing water quality. A 30" RCP will connect to an existing off-site 8' sump inlet located in the Greenhaven Filing 2 subdivision. Along the 30" pipe a 24" CMP riser with a grate set at 6827.00 will act as an emergency outlet in case of failure in the 4' x 4' grate. A 38' weir set at 6827.5 will pass the developed 100-year event in case of failure and be routed east down a riprap lined slope into the existing Greenhaven inlet. All flows combine and exit through an existing 30" RCP (pipe run 24), also off-site. This pipe was analyzed with the developed runoff and was found capable of handling the additional runoff. This flow exceeds the historic conditions, however as mentioned above detention will be provided in Pond 1 to accommodate the excess. Per the historic conditions at DP-EX3 the allowable release rate is Q_5=17.7 cfs and Q_{100}=35.8 cfs.

Design Point 4 corresponds to Historic DP-EX4. Runoff (Q_5=2.3cfs and Q_{100}=4.8 cfs) from Basin D's 0.83 acres sheet flows into the Dublin Boulevard and is directed by curb and gutter east to the Dublin and Black Forest Road storm system. Developed runoff is slightly more than the historic but the slight increase (Q_5=0.8 cfs and Q_{100}=1.5 cfs) should not tax the downstream system as it was designed to handle more per the MDDP Amend II mentioned above.

Design Point 5A corresponds to Historic DP-EX5A. Runoff (Q_5=1.3 cfs and Q_{100}=2.7 cfs) from Basin E1's 0.42 acres sheet flows into the Dublin Boulevard and is directed by curb and gutter west to the Dublin storm system. Developed runoff is slightly more than the historic (Q_5=0.7 cfs and Q_{100}=1.6 cfs) but the slight increase (Q_5=0.6 cfs and Q_{100}=1.1 cfs) of the developed flow from Design Point 5B (Q_5=1.3 cfs and Q_{100}=2.7 cfs) is less then historic (Q_5=2.2 cfs and Q_{100}=5.1 cfs) by (Q_5=0.9 cfs and Q_{100}=2.7 cfs) therefore they balance each other out. There should be no ill affects downstream as this is a small amount of flow and is not concentrated until it gets to Dublin Blvd, where the overall total flow matches with the MDDP Amend II.

Design Point 6 corresponds to Historic DP-EX6 (Q_5=3.7 cfs and Q_{100}=8.4 cfs). Runoff (Q_5=6.6 cfs and Q_{100}=13.1 cfs) from Basin F's 3.14 acres flows into the Vickie Lane and is directed by curb and

gutter west to Design Point 8. At this time the construction drawings for Edmondstown Drive and the east portion of Finglas Drive in Filing 3 are underway. Only little more then half (1.75 ac) of Basin F will be developed at this time.

Design Point 7 corresponds to Historic DP-EX7. Runoff (Q_5=9.9 cfs and Q_{100}=19.5 cfs) from Basin G's 4.90 acres flows into Vickie Lane and is directed by curb and gutter west to Design Point 8.

At Design Point 8 the combined runoff (Q_5=16.3 cfs and Q_{100}=32.1 cfs) from Design Point 6 and 7 will be captured by a 12' D10-R sump inlet and then routed downstream by a proposed 30"(Pipe run 25) to a future development by the same owner. Since this Design Point is located in the future Filing 5 it is recommended that at the time of Final Plat for Filing 3, 4, or 5 a detention pond must be addressed in the Final Drainage report for the increase in runoff. A coordinated effort should be done between these future filings and the downstream development as to limit the amount of detention ponds in the area. Per the historic Conditions at DP-EX8 the allowable release rate is Q_5=8.7 cfs and Q_{100}=19.6 cfs.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual. The Rational Method was used to estimate storm water runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual the pertinent data sheets are included in the appendix of this report. Haestad's PondPack was used to analyze the pipe and swale runs applying the "Manning n" formula.

EROSION CONTROL

It is the policy of the City of Colorado Springs that we submit an erosion control plan with the drainage report. At this time we respectfully request that the erosion control plan be submitted in conjunction with the final grading plan. Proposed straw bale check dams, silt fence, vehicle traffic

control, and reseeding are proposed as erosion control measures. Water Quality ponds have been sized to account for water quality before the runoff leaves our site where applicable. Extended Detention Basins have been used in the ponds (see appendix).

MAINTENANCE

The proposed storm drain pipe located in public streets will be dedicated to the city and will be maintained by the City of Colorado Springs. The public detention and water quality ponds located in Tracts C and F, including the outlet works and storm outlets will also be public but maintained by the Home Owners Association. Pipe run 2 in Tract A will be public and maintained by the City, but the above ground maintenance of the Tract will be by the HOA. The temporary water quality pond just west of Fling 1 will be private and maintained by the HOA until it is removed in Phase 2 grading.

CONSTRUCTION COST OPINION

FILING No. 1

Public Drainage Facilities Reimbursable

1.	42" RCP	550 LF	$ 85	$ 46,750
2.	36" RCP	65 LF	$ 75	$ 4,875
3.	30" RCP	95 LF	$ 65	$ 6,175
4.	Pond Outlet	2 EA	$ 10,000	$ 20,000
5.	42" FES	1 EA	$ 250	$ 250
6.	Pond Grading	2 EA	$ 10,000	$ 20,000
7.	Type 1 Manholes	1 EA	$ 4,000	$ 4,000
			Total	**$ 102,050**

Public Drainage Facilities Non-Reimbursable

1.	18" RCP	206 LF	$ 45	$ 22,770
2.	24" RCP	135 LF	$ 50	$ 6,900
3.	30" RCP	1175 LF	$ 60	$ 6,750
4.	6' D-10R Inlet	4 EA	$ 4,000	$ 16,000
5.	10' D-10R Inlet	3 EA	$ 5,500	$ 16,500
6.	20' D-10R Inlet	1 EA	$ 7,200	$ 7,200

7.	Type 1 Manholes	2 EA	$ 4,000		$ 8,000
				Total	**$ 54,450**

FILING No. 2

Private Drainage Facilities Non-Reimbursable

1.	18" RCP	830 LF	$ 45		$ 37,350
2.	24" RCP	75 LF	$ 50		$ 3,750
3.	30" RCP	55 LF	$ 60		$ 3,300
4.	6' D-10R Inlet	2 EA	$ 4,000		$ 8,000
5.	Type 13 Inlet	6 EA	$ 2,000		$ 12,000
				Total	**$ 64,400**

FILING No. 3 and No. 4

No Public Drainage Facilities

FILING No. 5

Public Drainage Facilities Non-Reimbursable

1.	18" RCP	130 LF	$ 45		$ 5,850
2.	12' D-10R Inlet	1 EA	$ 6,000		$ 6,000
				Total	**$ 11,850**

DRAINAGE FEES

The existing site is in the Sand Creek Basin. 2007 Drainage fees due on the final plat for the Dublin North Filing No. 1 are as follows:

DRAINAGE FEES:	10.00 acres	x	$9,041.00	=	$ 90,410.00
BRIDGE FEES:	10.00 acres	x	$ 568.00	=	$ 5,680.00
POND FEES:					
LAND :	10.00 acres	x	$ 1,070.00 2,744.00	=	$ 10,700.00 27,440.00
FACILITIES:	10.00 acres	x	~~$ 2,717.00~~	=	$ ~~27,717.00~~
				TOTAL $	~~**134,507.00**~~ **134,230.00**

Future Filings will need to post their fees at the time of Final Platting.

SUMMARY

Development of this site will not adversely affect the surrounding development. Proposed flows, as detailed in this report, will follow the drainage patterns outlined in this report and will be released at or below historic rates. This report is in conformance with the approved MDDP Amend II mentioned above and the downstream Final Drainage Report for Greenhaven Filings No 1 & 2. As the future filings are platted they will need to analyze each filing with a report.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Quentin N. Armijo, P.E.
Project Manager
Jobs/0717.00/word/071700-FDR

BIBLIOGRAPHY

"El Paso County and City of Colorado Springs Drainage Criteria Manual"

SCS Soils Map for El Paso County

"Master Development Drainage Plan Amendment No. II for the Easterly Portion of Ridgeview Subdivision and Preliminary Drainage Report for the Northeasterly Portion of Ridgeview Subdivision and Phase II Sand Creek Channel Improvements." Prepared by JR Engineering, February 2004.

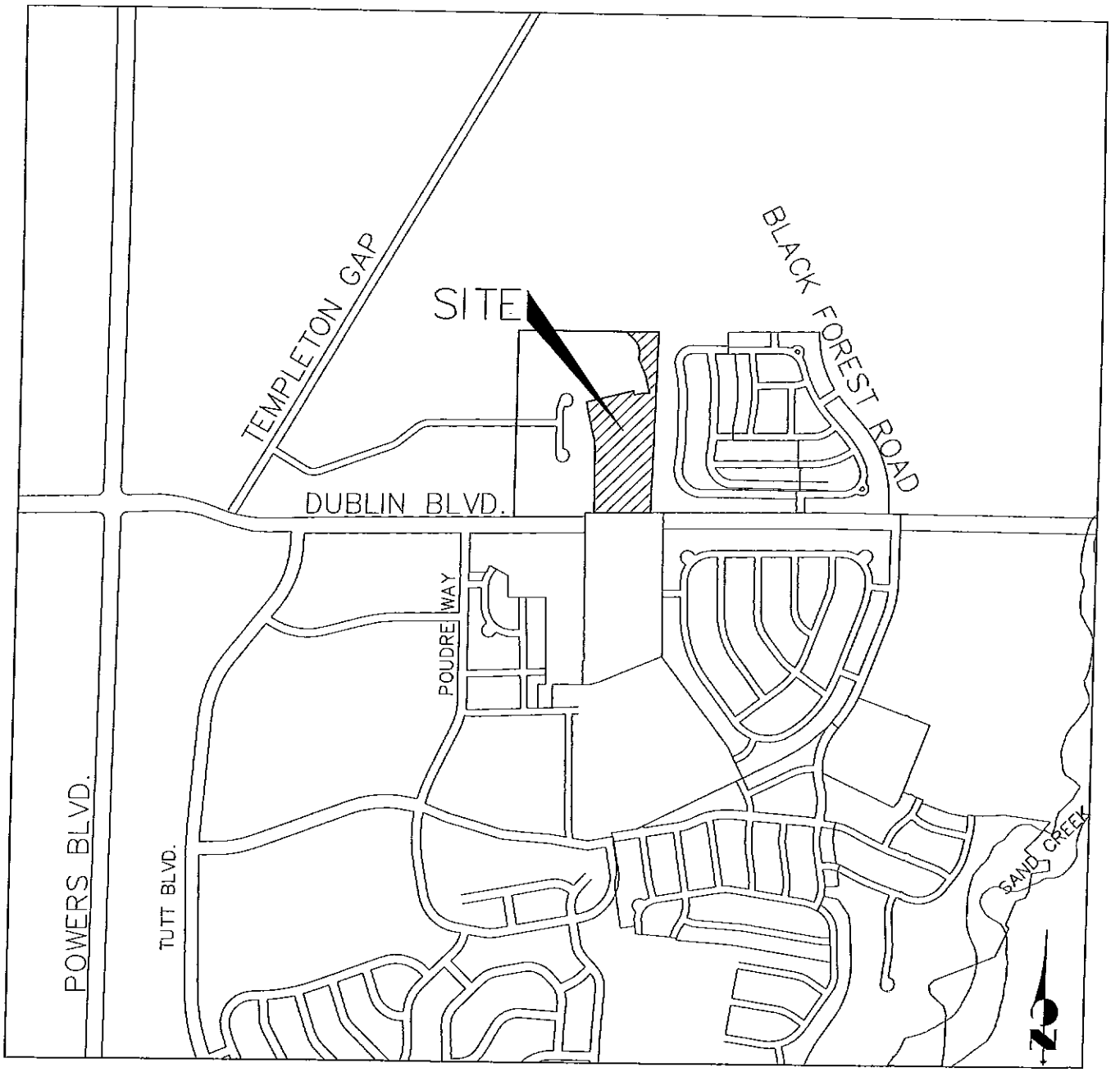
"Final Drainage Report for The Black Forest Road Portion of Greenhaven Filing No. 1, a Portion of Dublin Boulevard and Final Design/ Analysis Report for Black Forest Storm Drain", by JR Engineering, March 10, 2004.

"Final Drainage Report Greenhaven Filing No. 1 and 2 Colorado Springs, Colorado" by Terra Nova Engineering, Inc., dated March 2004.

"Sand Creek Drainage Basin Planning Study Preliminary Design Report" (DBPS) prepared by Kiowa Engineering, revised December 1998.

"Sand Creek Drainage Basin Planning Study Preliminary Design Report Technical Addendum" by Kiowa Engineering, revised October 1995.

VICINITY MAP



VICINITY MAP

N.T.S.

S.C.S. SOILS MAP


524400
524500
524600
524700
524800
524900
525000
525100
4309200
4309100
4309000
4308900
4308800
4308700
4308600
TEMPLETON GAP RD
VICKIE LN
DUBLIN BLVD
N
Meters
0 50 100 200 300
Feet
0 250 500 1,000 1,500

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 13N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 4, Dec 20, 2006

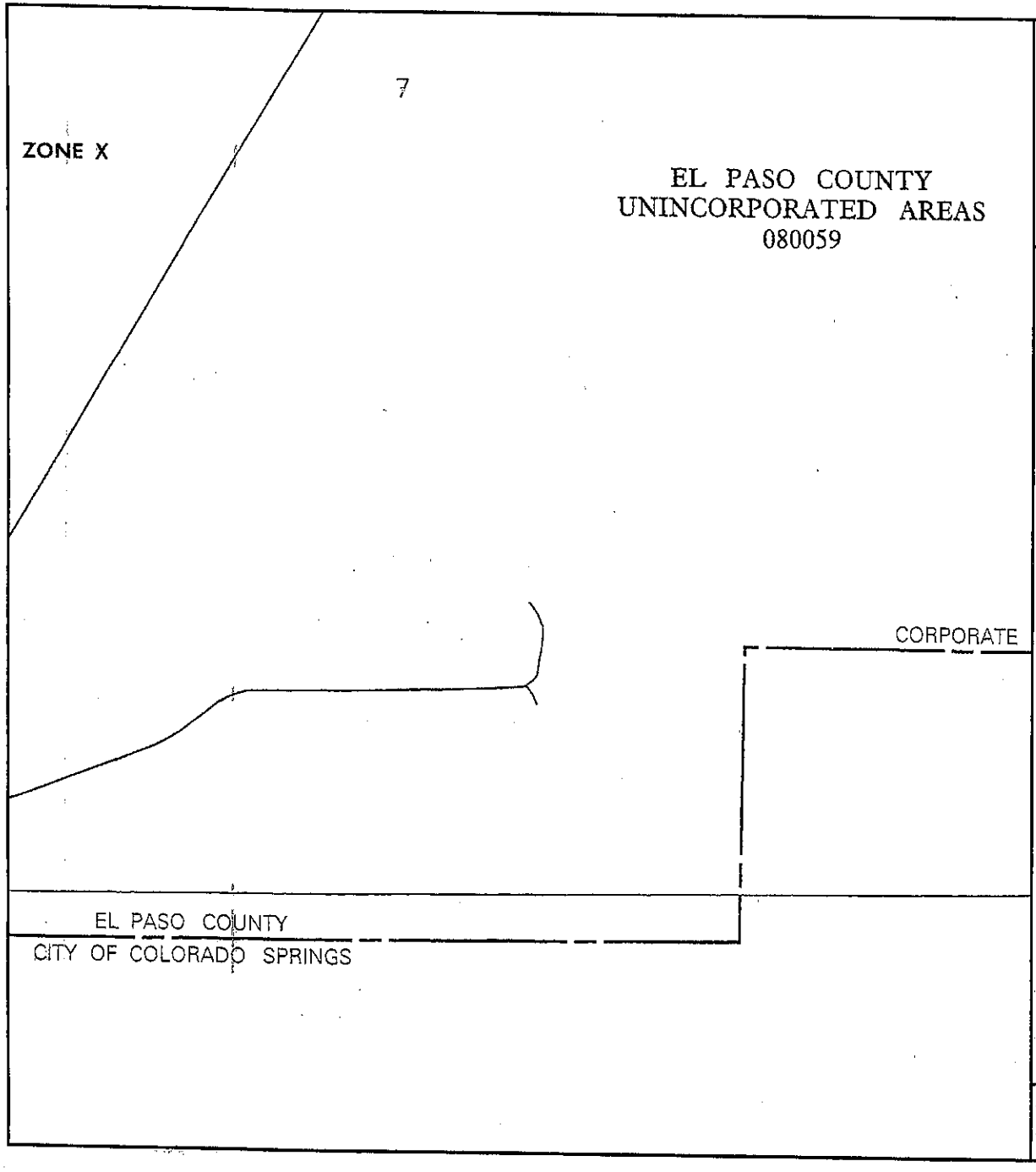
Date(s) aerial images were photographed: 1999

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

El Paso County Area, Colorado (CO625)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	92.3	100.0%
Totals for Area of Interest (AOI)		92.4	100.0%

FEMA FIRM MAP



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 537 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0537	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0537	F

MAP NUMBER
08041C0537 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

HYDROLOGIC CALCULATIONS

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Area Runoff Coefficient Summary)

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*COMPOSITE C*	
BASIN	TOTAL AREA	AREA	C_5	C_{100}	AREA	C_5	C_{100}	C_5	C_{100}
	(Acres)	*(Acres)*			*(Acres)*				
*OS-1**	8.18							0.39	0.49
*OS-2**	1.93							0.64	0.70
*EX-A**	18.06							0.39	0.49
*EX-B**	0.58							0.39	0.49
*EX-C**	10.61							0.50	0.60
EX-D	1.27	1.27	0.30	0.40	0.00	0.30	0.40	0.30	0.40
EX-E1	0.62	0.62	0.30	0.40	0.00	0.30	0.40	0.30	0.40
EX-E2	2.17	2.17	0.30	0.40	0.00	0.30	0.40	0.30	0.40
EX-F	3.69	3.69	0.30	0.40	0.00	0.30	0.40	0.30	0.40
EX-G	4.87	4.87	0.30	0.40	0.00	0.30	0.40	0.30	0.40

*COMPOSITE C INFORMATION TAKEN FROM "MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT NO. II FOR THE EASTERLY PORTION OF RIDGEVIEW SUBDIVISION AND PRELIMINARY DRAINAGE REPORT FOR THE NORTHEASTERLY PORTION OF RIDGEVIEW SUBDIVISION AND PHASE II SAND CREEK CHANNEL IMPROVEMENTS." BASIN OS-1, EX-A & EX-B CORRESPOND TO OS-145-2 FROM MDDP. BASIN EX-C CORRESPONDS TO OS-145-1 FROM MDDP. BASIN OS-2 IS PART OF BASIN OS-145-3 OF THE MDDP.

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Area Drainage Summary)

HISTORIC CONDITIONS

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_t	Tc USED	*INTENSITY*		*TOTAL FLOWS*	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
		* For Calcs See Runoff Summary															
*OS-1**	8.18	0.39	0.49	0.25	200	12.0	12.4	1000	8.4%	6.5	2.6	15.0	15.0	3.5	5.9	*11.1*	*23.6*
*OS-2**	1.93	0.64	0.70	0.25	100	12.0	7.0	300	6.7%	6.0	0.8	7.8	7.8	4.4	7.8	*5.4*	*10.5*
*EX-A**	18.06	0.39	0.49	0.25	200	12.0	12.4	900	9.3%	6.5	2.3	14.8	14.8	3.5	5.9	*24.6*	*52.6*
*EX-B**	0.58	0.39	0.49	0.25	230	12.0	14.0					14.0	14.0	3.6	6.1	*0.8*	*1.7*
*EX-C**	10.61	0.50	0.60	0.25	165	11.0	10.9	1170	5.0%	3.5	5.6	16.5	16.5	3.3	5.6	*17.7*	*35.8*
EX-D	1.27	0.30	0.40	0.25	150	8.0	11.2	160	5.0%	3.6	0.7	11.9	11.9	3.8	6.6	*1.5*	*3.3*
EX-E1	0.62	0.30	0.40	0.25	150	8.0	11.2	161	5.0%	4.6	0.6	11.8	11.8	3.8	6.6	*0.7*	*1.6*
EX-E2	2.17	0.30	0.40	0.25	175	5.0	14.9	70	4.3%	3.4	0.3	15.2	15.2	3.4	5.9	*2.2*	*5.1*
EX-F	3.69	0.30	0.40	0.25	200	12.0	12.4	590	3.4%	2.8	3.5	16.0	16.0	3.4	5.7	*3.7*	*8.4*
EX-G	4.87	0.30	0.40	0.25	150	8.0	11.2	160	3.8%	3.2	0.8	12.0	12.0	3.8	6.5	*5.5*	*12.7*

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Surface Routing Summary)
HISTORIC CONDITIONS

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow	
					I_5	I_{100}	Q_5	Q_{100}
EX-1	OS-1 & EX-A	10.23	12.86	15.0	3.5	5.9	35.5	75.7
EX-2	OS-2 & EX-B	1.46	1.52	14.0	3.6	6.1	5.2	9.3
EX-3	EX-C	5.30	6.36	16.5	3.3	5.6	17.7	35.8
EX-4	EX-D	0.38	0.51	11.9	3.8	6.6	1.5	3.3
EX-5A	EX-E1	0.19	0.25	11.8	3.8	6.6	0.7	1.6
EX-5B	EX-E2	0.65	0.87	15.2	3.4	5.9	2.2	5.1
EX-6	EX-F	1.11	1.47	16.0	3.4	5.7	3.7	8.4
EX-7	EX-G	1.46	1.95	12.0	3.8	6.5	5.5	12.7
EX-8	EX-F & EX-G	2.57	3.42	16.0	3.4	5.7	8.7	19.6

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Area Runoff Coefficient Summary)

DEVELOPED CONDITIONS

		STREETS / DEVELOPED			OVERLAND / UNDEVELOPED			COMPOSITE C	
BASIN	TOTAL AREA (Acres)	AREA (Acres)	C_5	C_{100}	AREA (Acres)	C_5	C_{100}	C_5	C_{100}
OS-1A	8.14	8.14	0.60	0.70	0.00	0.25	0.35	0.39	0.49
OS-1B	0.12	0.12	0.60	0.70	0.00	0.25	0.35	0.39	0.49
OS-1C	0.19	0.19	0.60	0.70	0.00	0.25	0.35	0.39	0.49
OS-2	1.93	1.93	0.60	0.70	0.00	0.25	0.35	0.64	0.70
A1	4.69	4.69	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A2	2.58	2.58	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A3	3.28	3.28	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A4	1.05	1.05	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A5	5.05	5.05	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A6	1.03	1.03	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A7	1.55	1.55	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A8	1.25	1.25	0.60	0.70	0.00	0.25	0.35	0.60	0.70
A9	1.24	1.24	0.60	0.70	0.00	0.25	0.35	0.60	0.70
B	0.43	0.00	0.60	0.70	0.43	0.25	0.35	0.25	0.35
C1	0.46	0.46	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C2	0.31	0.31	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C3	0.47	0.47	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C4	0.56	0.56	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C5	0.76	0.76	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C6	3.02	3.02	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C7	0.08	0.08	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C8	1.63	1.63	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C9	0.24	0.24	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C10	0.08	0.08	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C11	1.47	1.47	0.60	0.70	0.00	0.25	0.35	0.60	0.70
C12	0.91	0.91	0.60	0.70	0.00	0.25	0.35	0.60	0.70
D	0.83	0.83	0.60	0.70	0.00	0.25	0.35	0.60	0.70
E1	0.42	0.42	0.60	0.70	0.00	0.25	0.35	0.60	0.70
E2	0.55	0.55	0.60	0.70	0.00	0.25	0.35	0.60	0.70
F	3.14	3.14	0.60	0.70	0.00	0.25	0.35	0.60	0.70
F Temp	3.14	1.74	0.60	0.70	1.40	0.25	0.35	0.44	0.54
G	4.90	4.90	0.60	0.70	0.00	0.25	0.35	0.60	0.70
G Temp	4.90	0.00	0.60	0.70	4.90	0.25	0.35	0.25	0.35

F Temp and G Temp were calculated for the intermidiate condition until Filing 5's developed flow can be accomdated for with a detention pond

Calculated by: QNA
Date: 7/25/06

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Area Drainage Summary)

DEVELOPED CONDITIONS

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_i	Tc USED	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5 * For Calcs See Runoff Summary	C_{100}	C_5	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
OS-1A	8.14	0.39	0.49	0.25	200	12.0	12.4	1000	8.4%	6.5	2.6	15.0	15.0	3.5	5.9	11.0	23.5
OS-1B	0.12	0.39	0.49	0.25								0.0	5.0	5.0	9.1	0.2	0.5
OS-1C	0.19	0.39	0.49	0.25								0.0	5.0	5.0	9.1	0.4	0.8
OS-2	1.93	0.64	0.70	0.25	100	12.0	7.0	300	6.7%	6.0	0.8	7.8	7.8	4.4	7.8	5.4	10.5
A1	4.69	0.60	0.70	0.25	120	3.5	12.2	1155	1.7%	2.5	7.7	19.9	19.9	3.1	5.1	8.6	16.8
A2	2.58	0.60	0.70	0.25	135	12.0	9.0	70	4.3%	4.5	0.3	9.2	9.2	4.2	7.3	6.5	13.2
A3	3.28	0.60	0.70	0.25	150	4.5	13.5	420	0.7%	1.8	3.9	17.4	17.4	3.2	5.5	6.4	12.5
A4	1.05	0.60	0.70	0.25	60	1.2	9.8	420	0.7%	1.8	3.9	13.7	13.7	3.6	6.2	2.3	4.5
A5	5.05	0.60	0.70	0.25	130	3.5	13.1	370	3.8%	4.1	1.5	14.6	14.6	3.5	6.0	10.6	21.1
A6	1.03	0.60	0.70	0.25	60	1.2	9.8	420	0.7%	1.8	3.9	13.7	13.7	3.6	6.2	2.2	4.4
A7	1.55	0.60	0.70	0.25	200	12.0	12.4					12.4	12.4	3.7	6.4	3.5	7.0
A8	1.25	0.60	0.70	0.25	60	1.2	9.8	660	6.4%	5.2	2.1	11.9	11.9	3.8	6.6	2.9	5.7
A9	1.24	0.60	0.70	0.25	70	10.0	5.5					5.5	5.5	4.9	8.8	3.6	7.6
B	0.43	0.25	0.35	0.25	230	12.0	14.0					14.0	14.0	3.6	6.1	0.4	0.9
C1	0.46	0.60	0.70	0.25	40	2.0	5.9	50	2.0%	2.9	0.3	6.2	6.2	4.7	8.5	1.3	2.7
C2	0.31	0.60	0.70	0.25	70	2.0	9.4	110	4.5%	4.6	0.4	9.8	9.8	4.1	7.1	0.8	1.5
C3	0.47	0.60	0.70	0.25	50	2.0	7.1	120	2.0%	2.9	0.7	7.8	7.8	4.4	7.8	1.2	2.6
C4	0.56	0.60	0.70	0.25	40	2.0	5.9	155	2.0%	2.9	0.9	6.8	6.8	4.6	8.2	1.5	3.2
C5	0.76	0.60	0.70	0.25	60	2.0	8.3	160	1.9%	2.8	1.0	9.2	9.2	4.2	7.3	1.9	3.9
C6	3.02	0.60	0.70	0.25	60	2.0	8.3	470	3.4%	3.9	2.0	10.3	10.3	4.0	7.0	7.3	14.8
C7	0.08	0.60	0.70	0.25	50	1.0	8.9					8.9	8.9	4.2	7.4	0.2	0.4
C8	1.63	0.60	0.70	0.25	60	2.0	8.3	220	3.6%	4.0	0.9	9.2	9.2	4.2	7.3	4.1	8.4
C9	0.24	0.60	0.70	0.25	60	1.2	9.8	120	1.7%	2.5	0.8	10.6	10.6	4.0	6.9	0.6	1.1
C10	0.08	0.60	0.70	0.25	50	1.0	8.9					8.9	8.9	4.2	7.4	0.2	0.4
C11	1.47	0.60	0.70	0.25	120	4.0	11.7	200	4.0%	4.2	0.8	12.5	12.5	3.7	6.4	3.3	6.6
C12	0.91	0.60	0.70	0.25	95	6.0	8.4					8.4	8.4	4.3	7.6	2.3	4.8
D	0.83	0.60	0.70	0.25	40	2.0	5.9	180	4.4%	4.5	0.7	6.6	6.6	4.7	8.3	2.3	4.8
E1	0.42	0.60	0.70	0.25	60	12.0	4.6					4.6	5.0	5.0	9.1	1.3	2.7
E2	0.55	0.60	0.70	0.25	100	4.0	10.1					10.1	10.1	4.1	7.1	1.3	2.7
F	3.14	0.60	0.70	0.25	115	3.5	11.8	700	3.7%	4.1	2.8	14.7	14.7	3.5	6.0	6.6	13.1
F Temp	3.14	0.44	0.54	0.25	115	3.5	11.8	701	3.7%	4.1	2.8	14.7	14.7	3.5	6.0	4.9	10.2
G	4.90	0.60	0.70	0.25	120	3.5	12.2	800	3.0%	3.5	3.8	16.0	16.0	3.4	5.7	9.9	19.5
G Temp	4.90	0.25	0.35	0.25	120	3.5	12.2	801	3.0%	3.5	3.8	16.0	16.0	3.4	5.7	4.1	9.8

F Temp and G Temp were calculated for the intermidiate condition until Filing 5's developed flow can be accomdated for with a detention pond

Calculated by: QNA
Date: 7/25/06

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Surface Routing Summary)
DEVELOPED CONDITIONS

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow	
					I_5	I_{100}	Q_5	Q_{100}
1A	A1, A2, A3,& OS-1B	6.37	7.44	19.9	3.1	5.1	19.5	37.9
1B	A4	0.63	0.74	13.7	3.6	6.2	2.3	4.5
1A&1B	A1, A2, A3, A4, & OS-1B	7.01	8.18	19.9	3.1	5.1	21.4	41.7
1C	OS-1A	3.17	3.99	15.0	3.5	5.9	11.0	23.5
1D	A5 & OS-1C	3.11	3.63	14.6	3.5	6.0	10.9	21.7
1E	A6	0.62	0.72	13.7	3.6	6.2	2.2	4.4
1F	A8	0.75	0.87	11.9	3.8	6.6	2.9	5.7
1G	DP-1A THRU 1F, & A7	14.65	17.39	19.9	3.1	5.1	44.7	88.7
1H	A9 & DP-1F FLOW BY	0.95	1.18	5.5	4.9	8.8	4.6	10.3
2	OS-2 & B	1.34	1.50	14.0	3.6	6.1	4.8	9.1
3A	C1	0.28	0.32	6.2	4.7	8.5	1.3	2.7
3B	C2	0.18	0.22	9.8	4.1	7.1	0.8	1.5
3C	C3	0.28	0.33	7.8	4.4	7.8	1.2	2.6
3D	C4	0.34	0.39	6.8	4.6	8.2	1.5	3.2
3E	C5	0.46	0.54	9.2	4.2	7.3	1.9	3.9
3F	C6	1.81	2.11	10.3	4.0	7.0	7.3	14.8

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Surface Routing Summary)

3G	C7	0.05	0.06	8.9	4.2	7.4	0.2	0.4
3H	C8	0.98	1.14	9.2	4.2	7.3	4.1	8.4
3I	C9	0.14	0.17	10.6	4.0	6.9	0.6	1.1
3J	C10	0.05	0.06	8.9	4.2	7.4	0.2	0.4
3K	C11	0.88	1.03	12.5	3.7	6.4	3.3	6.6
3M	DP-3A THRU DP-3K, & C12	6.00	7.00	12.5	3.7	6.4	22.4	44.9
4	D	0.50	0.58	6.6	4.7	8.3	2.3	4.8
5A	E1	0.25	0.30	5.0	5.0	9.1	1.3	2.7
5B	E2	0.33	0.38	10.1	4.1	7.1	1.3	2.7
6	F	1.88	2.20	14.7	3.5	6.0	6.6	13.1
7	G	2.94	3.43	16.0	3.4	5.7	9.9	19.5
8	F & G	4.82	5.63	16.0	3.4	5.7	16.3	32.1
8 Temp	F Temp & G Temp	2.62	3.42	16.0	3.4	5.7	8.8	19.5

DEV. RUNOFF TO DP-3M		22.4	44.9
HIST. RUNOFF @ DP-EX-3		17.7	35.8
DEV. RUNOFF DP-3M OVER HIST. RUNOFF DP-EX-3		4.8	9.2
HIST. RUNOFF @ DP-EX-1	-	35.5	75.7
NEW ALLOWABLE HIST. RUNOFF	=	30.7	66.6

Calculated by: QNA
Date: 7/25/06
Checked by: _____

8 Temp was calculated for the intermidiate condition until Filing 5's developed flow can be accomdated for with a detention pond

POND 1 (NORTH END)

Table of Contents

Type.... I-D-F Table
Name.... cos5yr Tag: 5Y
File.... N:\jobs\0566.00\DRAINAGE\
Storm... cos5yr Tag: 5Y

Rainfall-Intensity-Duration Curve

Time, hrs	Intens., in/hr
.0833	5.2000
.1000	5.0000
.1167	4.8000
.1334	4.5000
.1501	4.3000
.1668	4.1000
.1835	4.0000
.2002	3.8000
.2169	3.7000
.2336	3.5000
.2503	3.4000
.2670	3.3000
.2837	3.2000
.3004	3.1000
.3171	3.0000
.3338	2.9000
.3505	2.8000
.3672	2.8000
.3839	2.7000
.4006	2.7000
.4173	2.6000
.4340	2.5000
.4507	2.5000
.4674	2.4000
.4841	2.4000
.5008	2.3000
.5175	2.3000
.5342	2.2000
.5509	2.2000
.5676	2.1000
.5843	2.1000
.6010	2.1000
.6177	2.0000
.6344	2.0000
.6511	1.9000
.7012	1.9000
.7179	1.8000
.7847	1.8000
.8014	1.7000
.8682	1.7000
.8849	1.6000
.9517	1.6000
.9684	1.5000
1.0000	1.5000

Type.... Tc Calcs Page 2.01
Name.... SUBAREA A Tag: POST

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .3322 hrs

Total Tc: .3322 hrs

Type.... Tc Calcs Page 2.02
Name.... SUBAREA A Tag: POST

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

Type.... Vol: Planimeter Page 3.01
Name.... POND DP-1G

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation	Planimeter	Area	A1+A2+sqr(A1*A2)	Volume	Volume Sum

(ft)	(sq.in)	(acres)	(acres)	(ac-ft)	(ac-ft)
6790.00	8880.000	.2039	.0000	.000	.000
6792.00	11793.000	.2707	.7095	.473	.473
6794.00	15726.000	.3610	.9444	.630	1.103
6796.00	19819.000	.4550	1.2213	.814	1.917

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Name.... Outlet 1

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6790.00 ft
Increment = .50 ft
Max. Elev.= 6796.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Inlet Box	R1	--->	TW	6790.000	6796.000
Inlet Box	R2	--->	TW	6792.000	6796.000

TW SETUP, DS Channel

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	= R1	
Structure Type	= Inlet Box	
# of Openings	= 1	
Invert Elev.	= 6790.00	ft
Orifice Area	= 4.5000	sq.ft
Orifice Coeff.	= .600	
Weir Length	= 12.00	ft
Weir Coeff.	= 3.400	
K, Submerged	= .000	
K, Reverse	= 1.000	
Kb,Barrel	= .000000	(per ft of full flow)
Barrel Length	= .00	ft
Mannings n	= .0000	

Structure ID	= R2	
Structure Type	= Inlet Box	
# of Openings	= 1	
Invert Elev.	= 6792.00	ft
Orifice Area	= 4.5000	sq.ft
Orifice Coeff.	= .600	
Weir Length	= 12.00	ft
Weir Coeff.	= 3.400	
K, Submerged	= .000	
K, Reverse	= 1.000	
Kb,Barrel	= .000000	(per ft of full flow)
Barrel Length	= .00	ft
Mannings n	= .0000	

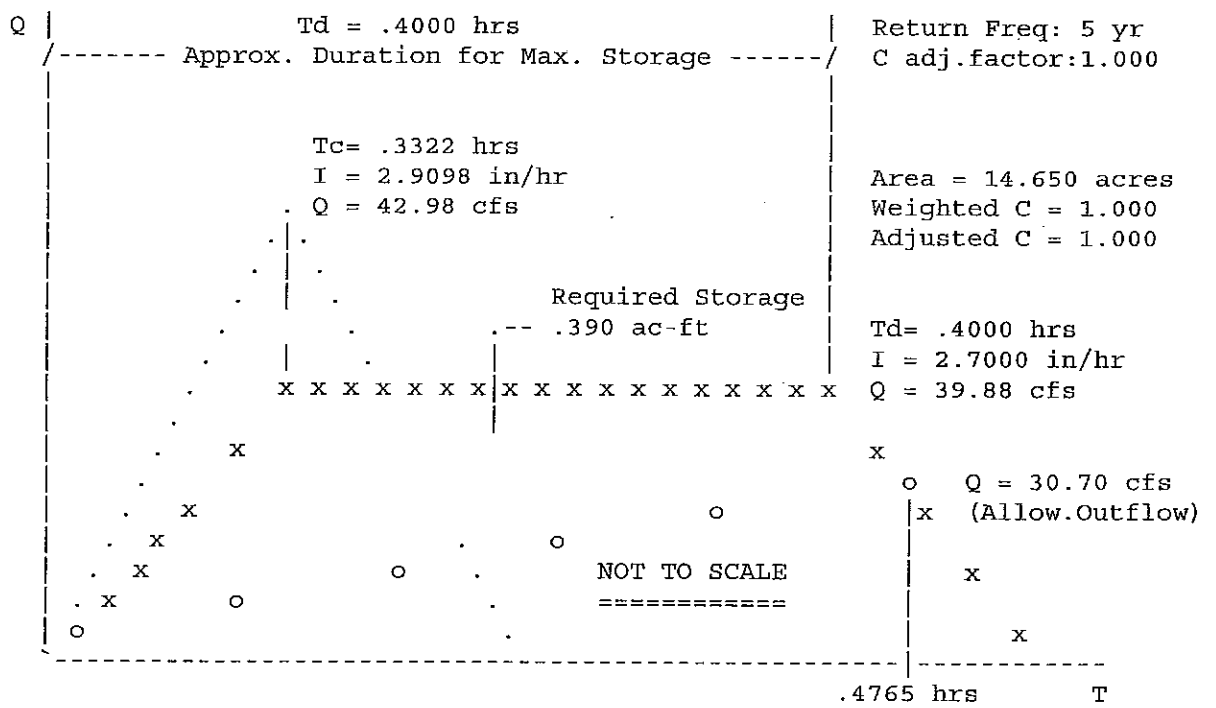
LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = N:\jobs\0566.00\DRAINAGE\
Inflow  HYG file = NONE STORED - POND DP-1G   IN  5Y
Outflow HYG file = NONE STORED - POND DP-1G   OUT 5Y

Pond Node   Data = POND DP-1G
Pond Volume Data = POND DP-1G
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =  6790.00 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .0500 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =     39.87 cfs    at     .3500 hrs
Peak Outflow      =     27.85 cfs    at     .5000 hrs
-----------------------------------------------------
Peak Elevation    =   6791.66 ft
Peak Storage =           .383 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol   =        .000
+ HYG Vol IN    =      1.313
- Infiltration =        .000
- HYG Vol OUT   =      1.313
- Retained Vol =        .000
                -----------
Unrouted Vol =       -.000 ac-ft  (.001% of Inflow Volume)
```

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----
Method I

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

RETURN FREQUENCY: 5 yr	Allowable Outflow: 30.70 cfs
'C' Adjustment: 1.000	Required Storage: .390 ac-ft
Peak Inflow: 39.88 cfs	
.HYG File: 5Y	



File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

RATIONAL C COEFFICIENT DATA

Soil/Surface Description	C	Area acres	C x Area acres
dp-1G	1.0000	14.650	14.650
WEIGHTED C & TOTAL AREA --->	1.0000	14.650	14.650

Table of Contents

Table of Contents (continued)

Type.... I-D-F Table
Name.... cos100yr Tag: 100y Event: 100 yr
File.... N:\jobs\0566.00\DRAINAGE\
Storm... cos100yr Tag: 100y

Rainfall-Intensity-Duration Curve

Time, hrs	Intens., in/hr
.0833	9.0000
.1000	8.6000
.1167	8.2000
.1333	7.8000
.1502	7.4000
.1668	7.0000
.1835	6.8000
.2002	6.6000
.2168	6.3000
.2337	6.1000
.2503	5.9000
.2670	5.7000
.2837	5.6000
.3003	5.4000
.3172	5.3000
.3338	5.1000
.3505	5.0000
.3672	4.9000
.3838	4.7000
.4007	4.6000
.4173	4.5000
.4340	4.4000
.4507	4.3000
.4673	4.3000
.4842	4.2000
.5008	4.1000
.5175	4.0000
.5342	3.9000
.5508	3.9000
.5677	3.8000
.5843	3.7000
.6010	3.6000
.6177	3.6000
.6343	3.5000
.6512	3.4000
.6678	3.4000
.6845	3.4000
.7012	3.3000
.7178	3.3000
.7347	3.2000
.7513	3.2000
.7680	3.2000
.7847	3.1000
.8013	3.1000
.8182	3.0000
.8348	3.0000
.8515	3.0000
.8682	2.9000
.8848	2.9000
.9017	2.8000

.9183	2.8000
.9350	2.8000
.9517	2.7000
.9683	2.7000
.9852	2.6000
1.0000	2.6000

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .3322 hrs

Total Tc: .3322 hrs

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
6790.00	8880.000	.2039	.0000	.000	.000
6792.00	11793.000	.2707	.7095	.473	.473
6794.00	15726.000	.3610	.9444	.630	1.103
6796.00	19819.000	.4550	1.2213	.814	1.917

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6790.00 ft
Increment = .50 ft
Max. Elev.= 6796.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Inlet Box	R1	--->	TW	6790.000	6796.000
Inlet Box	R2	--->	TW	6792.000	6796.000

TW SETUP, DS Channel

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	= R1	
Structure Type	= Inlet Box	
# of Openings	= 1	
Invert Elev.	= 6790.00	ft
Orifice Area	= 4.5000	sq.ft
Orifice Coeff.	= .600	
Weir Length	= 12.00	ft
Weir Coeff.	= 3.400	
K, Submerged	= .000	
K, Reverse	= 1.000	
Kb,Barrel	= .000000	(per ft of full flow)
Barrel Length	= .00	ft
Mannings n	= .0000	

Structure ID	= R2	
Structure Type	= Inlet Box	
# of Openings	= 1	
Invert Elev.	= 6792.00	ft
Orifice Area	= 4.5000	sq.ft
Orifice Coeff.	= .600	
Weir Length	= 12.00	ft
Weir Coeff.	= 3.400	
K, Submerged	= .000	
K, Reverse	= 1.000	
Kb,Barrel	= .000000	(per ft of full flow)
Barrel Length	= .00	ft
Mannings n	= .0000	

Type.... Outlet Input Data
Name.... Outlet 1

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 30
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

Type.... Pond Routing Summary
Name.... POND DP-1G OUT Tag: 100y
File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW
Storm... cos100yr Tag: 100y

LEVEL POOL ROUTING SUMMARY

HYG Dir = N:\jobs\0566.00\DRAINAGE\
Inflow HYG file = NONE STORED - POND DP-1G IN 100y
Outflow HYG file = NONE STORED - POND DP-1G OUT 100y

Pond Node Data = POND DP-1G
Pond Volume Data = POND DP-1G
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6790.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0500 hrs

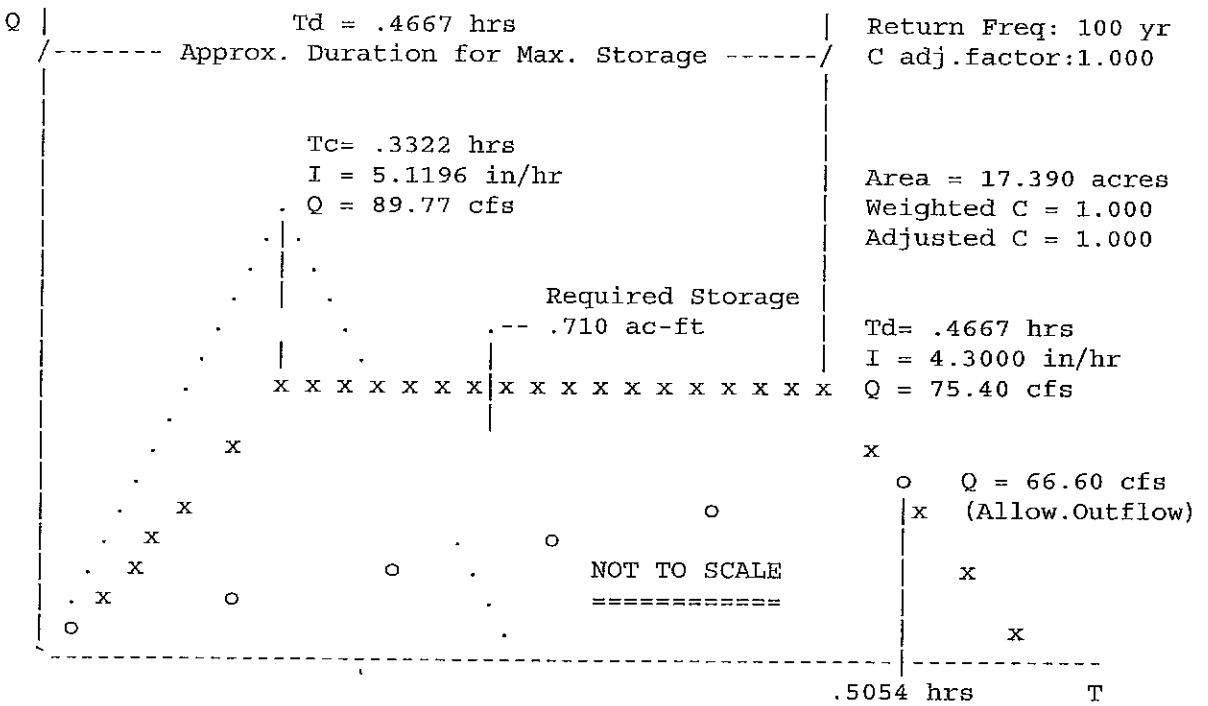
INFLOW/OUTFLOW HYDROGRAPH SUMMARY
==========
Peak Inflow = 75.40 cfs at .4000 hrs
Peak Outflow = 61.86 cfs at .5500 hrs

```
  Peak Elevation     =    6793.17 ft
  Peak Storage =             .819 ac-ft
  ========================================================


  MASS BALANCE (ac-ft)
  ----------------------------
+ Initial Vol   =         .000
+ HYG Vol IN    =        2.903
- Infiltration =         .000
- HYG Vol OUT   =        2.903
- Retained Vol =         .000
                  ----------
  Unrouted Vol =        -.000 ac-ft  (.000% of Inflow Volume)
```

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----
Method I

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

RETURN FREQUENCY: 100 yr	Allowable Outflow: 66.60 cfs
'C' Adjustment: 1.000	Required Storage: .710 ac-ft
Peak Inflow: 75.40 cfs	
.HYG File: 100y	



Type.... C and Area
Name.... SUBAREA A Tag: POST

File.... N:\jobs\0566.00\DRAINAGE\POND DP-1G OVERDETAIN.PPW

RATIONAL C COEFFICIENT DATA

Soil/Surface Description	C	Area acres	C x Area acres
dp-1G	1.0000	17.390	17.390
WEIGHTED C & TOTAL AREA --->	1.0000	17.390	17.390

POND 2 (SOUTH END)

Table of Contents

Type.... I-D-F Table
Name.... cos100yr Tag: 100y
File.... N:\jobs\0717.00\Drainage\□□□□□□□□□□□□
Storm... cos100yr Tag: 100y

Rainfall-Intensity-Duration Curve

Time, hrs	Intens., in/hr
.0833	9.0000
.1000	8.6000
.1167	8.2000
.1333	7.8000
.1502	7.4000
.1668	7.0000
.1835	6.8000
.2002	6.6000
.2168	6.3000
.2337	6.1000
.2503	5.9000
.2670	5.7000
.2837	5.6000
.3003	5.4000
.3172	5.3000
.3338	5.1000
.3505	5.0000
.3672	4.9000
.3838	4.7000
.4007	4.6000
.4173	4.5000
.4340	4.4000
.4507	4.3000
.4673	4.3000
.4842	4.2000
.5008	4.1000
.5175	4.0000
.5342	3.9000
.5508	3.9000
.5677	3.8000
.5843	3.7000
.6010	3.6000
.6177	3.6000
.6343	3.5000
.6512	3.4000
.6678	3.4000
.6845	3.4000
.7012	3.3000
.7178	3.3000
.7347	3.2000
.7513	3.2000
.7680	3.2000
.7847	3.1000
.8013	3.1000
.8182	3.0000
.8348	3.0000

Time, hrs	Intens., in/hr
.8515	3.0000
.8682	2.9000
.8848	2.9000
.9017	2.8000
.9183	2.8000
.9350	2.8000
.9517	2.7000
.9683	2.7000
.9852	2.6000
1.0000	2.6000

File.... N:\jobs\0717.00\Drainage\POND DP-3M.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .2083 hrs

Total Tc: .2083 hrs

File.... N:\jobs\0717.00\Drainage\POND DP-3M.PPW

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

Type.... Vol: Planimeter
Name.... POND DP-3M

File.... N:\jobs\0717.00\Drainage\POND DP-3M.PPW

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
6824.00	294.000	.0067	.0000	.000	.000
6826.00	2972.000	.0682	.0964	.064	.064
6828.00	4638.000	.1065	.2599	.173	.238

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: B21C01207088 Terra Nova Engineering and Surveying, Inc.
PondPack Ver: Compute Time: Date:

Type.... Outlet Input Data
Name.... Outlet 1

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 6824.00 ft
Increment = .50 ft
Max. Elev.= 6828.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Inlet Box	R1	--->	TW	6826.500	6828.000
Weir-Rectangular	WE	--->	TW	6827.500	6828.000

TW SETUP, DS Channel

File.... N:\jobs\0717.00\Drainage\POND DP-3M.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = R1
Structure Type    = Inlet Box
-----------------------------------
# of Openings     =         1
Invert Elev.      =   6826.50 ft
Orifice Area      =   10.0000 sq.ft
Orifice Coeff.    =      .600
Weir Length       =     18.00 ft
Weir Coeff.       =     3.400
K, Submerged      =      .000
K, Reverse        =     1.000
Kb,Barrel         =   .000000  (per ft of full flow)
Barrel Length     =       .00 ft
Mannings n        =     .0000
```

```
Structure ID      = WE
Structure Type    = Weir-Rectangular
-----------------------------------
# of Openings     =         1
Crest Elev.       =   6827.50 ft
Weir Length       =     38.00 ft
Weir Coeff.       =  3.400000

Weir TW effects     (Use adjustment equation)
```

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .10 cfs
Max.  Q tolerance =    .10 cfs
```

Type.... Pond Routing Summary
Name.... POND DP-3M OUT Tag: 100y
File.... N:\jobs\0717.00\Drainage\POND DP-3M.PPW
Storm... cos100yr Tag: 100y

LEVEL POOL ROUTING SUMMARY

HYG Dir = N:\jobs\0717.00\Drainage\
Inflow HYG file = NONE STORED - POND DP-3M IN 100y
Outflow HYG file = NONE STORED - POND DP-3M OUT 100y

Pond Node Data = POND DP-3M
Pond Volume Data = POND DP-3M
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	6824.00 ft
Starting Volume	=	.000 ac-ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	43.67 cfs	at	.2000 hrs
Peak Outflow	=	40.12 cfs	at	.2500 hrs
Peak Elevation	=	6827.35 ft		
Peak Storage	=	.173 ac-ft		

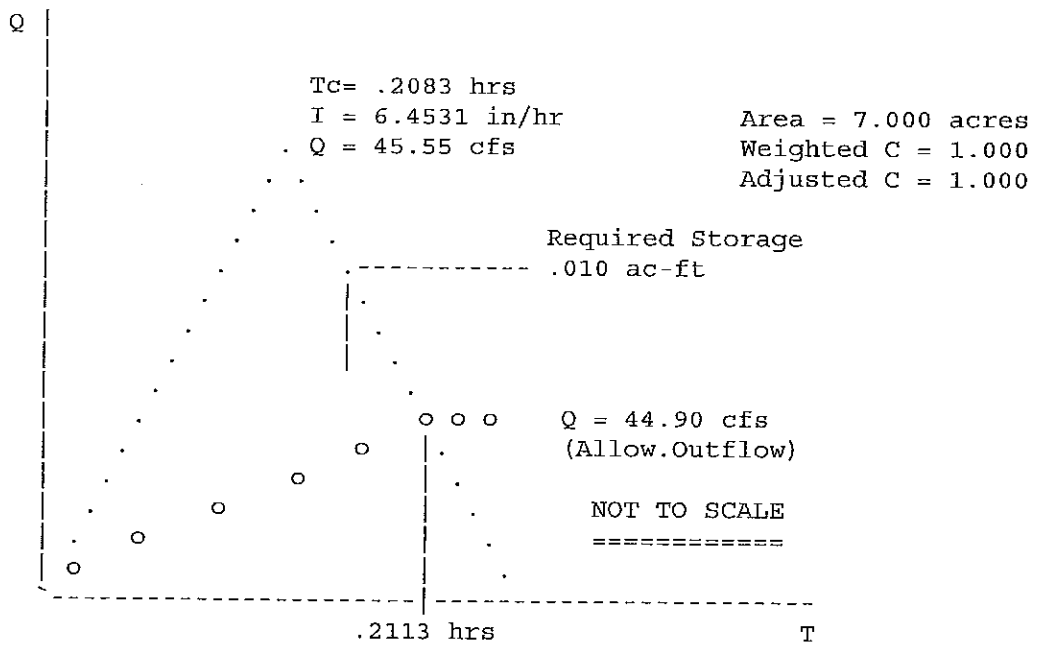
MASS BALANCE (ac-ft)

+ Initial Vol	=	.000
+ HYG Vol IN	=	.783
- Infiltration	=	.000
- HYG Vol OUT	=	.683
- Retained Vol	=	.100
Unrouted Vol	=	.000 ac-ft (.000% of Inflow Volume)

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----
Method I

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

```
**********************************************************************
*  RETURN FREQUENCY: 100 yr     |  Allowable Outflow: 44.90 cfs       *
*  'C' Adjustment: 1.000        |  Required Storage: .010 ac-ft       *
*               STORM DURATION = Tc for Max.Storage                   *
*--------------------------------------------------------------------*
*  Peak Inflow: 45.55 cfs                                            *
* .HYG File:   100y                                                  *
**********************************************************************
```



Type.... C and Area
Name.... SUBAREA C Tag: POST

File.... N:\jobs\0717.00\Drainage\POND DP-3M.PPW

RATIONAL C COEFFICIENT DATA

Soil/Surface Description	C	Area acres	C x Area acres
DP-3M	1.0000	7.000	7.000
WEIGHTED C & TOTAL AREA --->	1.0000	7.000	7.000

DRAINAGE MAPS

HYDRAULIC CALCULATIONS

WATER QUALITY CAPTURE POND CALCULATIONS

NORTH POND 1
WQVC

ELEV	AREA	AREA AVG.	DELTA ELEV.	VOLUME	VOLUME CU FT	VOLUME AC FT
6788.00	5655					
		7268	2	14535		
6790.00	8880				14535	0.33

End Area Method: 14535 CU FT 0.33 AC FT

NORTH POND 1
NORTH FORBAY AREA 1

ELEV	AREA	AREA AVG.	DELTA ELEV.	VOLUME	VOLUME CU FT	VOLUME AC FT
6786.00	210					
		399	1	399		
6787.00	587				399	0.01
		820	1	820		
6788.00	1052				1218	0.03

End Area Method: 1218 CU FT 0.028 AC FT

NORTH POND 1
SOUTH FORBAY AREA 2

ELEV	AREA	AREA AVG.	DELTA ELEV.	VOLUME	VOLUME CU FT	VOLUME AC FT
6786.00	100					
		188	1	188		
6787.00	275				188	0.00
		470	1	470		
6788.00	665				658	0.02

End Area Method: 658 CU FT 0.015 AC FT

TOTAL 1875.50 CU FT 0.043 AC FT

EAST POND 2
DETENTION AREA

ELEV	AREA	AREA AVG.	DELTA ELEV.	VOLUME	VOLUME CU FT	VOLUME AC FT
6790.00	8880					
		10337	2	20673		
6792.00	11793				20673	0.47
		13760	2	27519		
6794.00	15726				48193	1.11
		17772	2	35545		
6796.00	19819				83737	1.92

83737 1.92

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer: QUENTIN ARMIJO
Company: TERRA NOVA ENGINEERING
Date: July 24, 2007
Project: DUBLIN NORTH NO. 1
Location: POND 1 (NORTH END)

1. Basin Storage Volume	
A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	I_a = 50.00 % i = 0.50
B) Contributing Watershed Area (Area)	Area = 20.49 acres
C) Water Quality Capture Volume (WQCV) ($WQCV = 1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)$)	WQCV = 0.21 watershed inches
D) Design Volume: Vol = (WQCV / 12) * Area * 1.2	Vol = 0.423 acre-feet
2. Outlet Works	
A) Outlet Type (Check One)	x Orifice Plate Perforated Riser Pipe Other:
B) Depth at Outlet Above Lowest Perforation (H)	H = 3.00 feet
C) Required Maximum Outlet Area per Row, (A_o)	A_o = 0.52 square inches
D) Perforation Dimensions **(enter one only)**: i) Circular Perforation Diameter **OR** ii) 2" Height Rectangular Perforation Width	D = 0.5000 inches, **OR** W = inches
E) Number of Columns (nc, See Table 6a-1 For Maximum)	nc = 2 number
F) Actual Design Outlet Area per Row (A_o)	A_o = 0.39 square inches
G) Number of Rows (nr)	nr = 9 number
H) Total Outlet Area (A_{ot})	A_{ot} = 3.53 square inches
3. Trash Rack	
A) Needed Open Area: A_t = 0.5 * (Figure 7 Value) * A_{ot}	A_t = 128 square inches
B) Type of Outlet Opening (Check One)	X ≤ 2" Diameter **Round** 2" High **Rectangular** Other:
C) For 2", or Smaller, **Round Opening** (Ref.: Figure 6a):	
i) Width of Trash Rack and Concrete Opening (W_{conc}) from Table 6a-1	W_{conc} = 6 inches
ii) Height of Trash Rack Screen (H_{TR})	H_{TR} = 60 inches

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer: QUENTIN ARMIJO
Company: TERRA NOVA ENGINEERING
Date: July 24, 2007
Project: DUBLIN NORTH NO. 1
Location: POND 1 (NORTH END)

iii) Type of Screen (Based on Depth H), Describe if "Other"	2 S.S. #93 VEE Wire (US Filter) Other:
iv) Screen Opening Slot Dimension, Describe if "Other"	X 0.139" (US Filter) Other:
v) Spacing of Support Rod (O.C.) Type and Size of Support Rod (Ref.: Table 6a-2)	0.75 inches #156 VEE
vi) Type and Size of Holding Frame (Ref.: Table 6a-2)	3/8 in. x 1.0 in. flat bar
D) For 2" High **Rectangular Opening** (Refer to Figure 6b):	
I) Width of Rectangular Opening (W)	W = inches
ii) Width of Perforated Plate Opening (W_{conc} = W + 12")	W_{conc} = inches
iii) Width of Trashrack Opening ($W_{opening}$) from Table 6b-1	$W_{opening}$ = inches
iv) Height of Trash Rack Screen (H_{TR})	H_{TR} = inches
v) Type of Screen (based on depth H) (Describe if "Other")	Klemp™ KPP Series Aluminum Other:
vi) Cross-bar Spacing (Based on Table 6b-1, Klemp™ KPP Grating). Describe if "Other"	inches Other:
vii) Minimum Bearing Bar Size (Klemp™ Series, Table 6b-2) (Based on depth of WQCV surcharge)	
4. Detention Basin length to width ratio	2.50 (L/W)
5 Pre-sedimentation Forebay Basin - Enter design values	
A) Volume (5 to 10% of the Design Volume in 1D)	0.042 acre-feet
B) Surface Area	0.039 acres
C) Connector Pipe Diameter (Size to drain this volume in 5-minutes under inlet control)	10 inches
D) Paved/Hard Bottom and Sides	n yes/no

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer: QUENTIN ARMIJO
Company: TERRA NOVA ENGINEERING
Date: July 24, 2007
Project: DUBLIN NORTH NO. 1
Location: POND 1 (NORTH END)

6. Two-Stage Design	
A) Top Stage (D_{WQ} = 2' Minimum)	D_{WQ} = 2.00 feet Storage= 0.330 acre-feet
B) Bottom Stage (D_{BS} = D_{WQ} + 1.5' Minimum, D_{WQ} + 3.0' Maximum, Storage = 5% to 15% of Total WQCV)	D_{BS} = 3.50 feet Storage= 0.063 acre-feet Surf. Area= 0.018 acres
C) Micro Pool (Minimum Depth = the Larger of 0.5 * Top Stage Depth or 2.5 Feet)	Depth= 2.50 feet Storage= 0.150 acre-feet Surf. Area= 0.060 acres
D) Total Volume: Vol_{tot} = Storage from 5A + 6A + 6B Must be ≥ Design Volume in 1D	Vol_{tot} = 0.436 acre-feet
7. Basin Side Slopes (Z, horizontal distance per unit vertical) Minimum Z = 3, Flatter Preferred	Z = 3.00 (horizontal/vertical)
8. Dam Embankment Side Slopes (Z, horizontal distance) per unit vertical) Minimum Z = 3, Flatter Preferred	Z = 3.00 (horizontal/vertical)
9. Vegetation (Check the method or describe "Other")	x Native Grass Irrigated Turf Grass Other:

Notes:

SOUTH POND 2
WQVC

ELEV	AREA	AREA AVG.	DELTA ELEV.	VOLUME	VOLUME CU FT	VOLUME AC FT
6825.50	3005					
		3606	2	7212		
6827.50	4207				7212	0.166
			End Area Method:		**7212**	**0.166**
					CU FT	**AC FT**

SOUTH POND 2
FORBAY AREA 1

ELEV	AREA	AREA AVG.	DELTA ELEV.	VOLUME	VOLUME CU FT	VOLUME AC FT
6824.50	194					
		243	0.5	121		
6825.00	291				121	0.003
		411	1	411		
6826.00	531				532	0.012
			End Area Method:		**411**	**0.012**
					CU FT	**AC FT**

SOUTH POND 2
BOTTOM STAGE

ELEV	AREA	AREA AVG.	DELTA ELEV.	VOLUME	VOLUME CU FT	VOLUME AC FT
6824.00	99					
		240	1	240		
6825.00	380				240	0.005
		573	1	573		
6826.00	765				812	0.019
			End Area Method:		**812**	**0.019**
					CU FT	**AC FT**

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer: QUENTIN ARMIJO
Company: TERRA NOVA ENGINEERING
Date: July 24, 2007
Project: DBLIN NORTH NO. 1
Location: POND 2 (SOUTH END)

1. Basin Storage Volume	
A) Tributary Area's Imperviousness Ratio (i = I_a / 100)	I_a = 60.00 % i = 0.60
B) Contributing Watershed Area (Area)	Area = 9.09 acres
C) Water Quality Capture Volume (WQCV) (WQCV =1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I))	WQCV = 0.24 watershed inches
D) Design Volume: Vol = (WQCV / 12) * Area * 1.2	Vol = 0.215 acre-feet
2. Outlet Works	
A) Outlet Type (Check One)	_ Orifice Plate _ Perforated Riser Pipe _ Other:
B) Depth at Outlet Above Lowest Perforation (H)	H = 2.00 feet
C) Required Maximum Outlet Area per Row, (A_o)	A_o = 0.46 square inches
D) Perforation Dimensions **(enter one only)**: i) Circular Perforation Diameter **OR** ii) 2" Height Rectangular Perforation Width	D = 0.5000 inches, **OR** W = _ inches
E) Number of Columns (nc, See Table 6a-1 For Maximum)	nc = 2 number
F) Actual Design Outlet Area per Row (A_o)	A_o = 0.39 square inches
G) Number of Rows (nr)	nr = 6 number
H) Total Outlet Area (A_{ot})	A_{ot} = 2.36 square inches
3. Trash Rack	
A) Needed Open Area: A_t = 0.5 * (Figure 7 Value) * A_{ot}	A_t = 85 square inches
B) Type of Outlet Opening (Check One)	X ≤ 2" Diameter **Round** _ 2" High **Rectangular** _ Other:
C) For 2", or Smaller, **Round Opening** (Ref.: Figure 6a):	
i) Width of Trash Rack and Concrete Opening (W_{conc}) from Table 6a-1	W_{conc} = 6 inches
ii) Height of Trash Rack Screen (H_{TR})	H_{TR} = 48 inches

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer: QUENTIN ARMIJO
Company: TERRA NOVA ENGINEERING
Date: July 24, 2007
Project: DBLIN NORTH NO. 1
Location: POND 2 (SOUTH END)

iii) Type of Screen (Based on Depth H), Describe if "Other"	2 S.S. #93 VEE Wire (US Filter) Other:
iv) Screen Opening Slot Dimension, Describe if "Other"	X 0.139" (US Filter) Other:
v) Spacing of Support Rod (O.C.) Type and Size of Support Rod (Ref.: Table 6a-2)	0.75 inches #156 VEE
vi) Type and Size of Holding Frame (Ref.: Table 6a-2)	3/8 in. x 1.0 in. flat bar
D) For 2" High **Rectangular Opening** (Refer to Figure 6b):	
I) Width of Rectangular Opening (W)	W = inches
ii) Width of Perforated Plate Opening (W_{conc} = W + 12")	W_{conc} = inches
iii) Width of Trashrack Opening ($W_{opening}$) from Table 6b-1	$W_{opening}$ = inches
iv) Height of Trash Rack Screen (H_{TR})	H_{TR} = inches
v) Type of Screen (based on depth H) (Describe if "Other")	Klemp™ KPP Series Aluminum Other:
vi) Cross-bar Spacing (Based on Table 6b-1, Klemp™ KPP Grating). Describe if "Other"	inches Other:
vii) Minimum Bearing Bar Size (Klemp™ Series, Table 6b-2) (Based on depth of WQCV surcharge)	
4. Detention Basin length to width ratio	1.50 (L/W)
5 Pre-sedimentation Forebay Basin - Enter design values	
A) Volume (5 to 10% of the Design Volume in 1D)	0.012 acre-feet
B) Surface Area	0.012 acres
C) Connector Pipe Diameter (Size to drain this volume in 5-minutes under inlet control)	10 inches
D) Paved/Hard Bottom and Sides	N yes/no

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer: QUENTIN ARMIJO
Company: TERRA NOVA ENGINEERING
Date: July 24, 2007
Project: DBLIN NORTH NO. 1
Location: POND 2 (SOUTH END)

6. Two-Stage Design	
A) Top Stage (D_{WQ} = 2' Minimum)	D_{WQ} = 2.00 feet Storage= 0.166 acre-feet
B) Bottom Stage (D_{BS} = D_{WQ} + 1.5' Minimum, D_{WQ} + 3.0' Maximum, Storage = 5% to 15% of Total WQCV)	D_{BS} = 3.50 feet Storage= 0.019 acre-feet Surf. Area= 0.005 acres
C) Micro Pool (Minimum Depth = the Larger of 0.5 * Top Stage Depth or 2.5 Feet)	Depth= 2.50 feet Storage= 0.015 acre-feet Surf. Area= 0.006 acres
D) Total Volume: Vol_{tot} = Storage from 5A + 6A + 6B Must be ≥ Design Volume in 1D	Vol_{tot} = acre-feet
7. Basin Side Slopes (Z, horizontal distance per unit vertical) Minimum Z = 3, Flatter Preferred	Z = 3.00 (horizontal/vertical)
8. Dam Embankment Side Slopes (Z, horizontal distance) per unit vertical) Minimum Z = 3, Flatter Preferred	Z = 3.00 (horizontal/vertical)
9. Vegetation (Check the method or describe "Other")	X Native Grass Irrigated Turf Grass Other:

Notes:

TEMP. WQ POND
WQVC

ELEV	AREA	AREA AVG	DELTA ELEV	VOLUME	VOLUME CU FT	VOLUME AC FT
6834.00	190					
		2004	2	4007		
6836.00	3817				4007	0.092
		7881	2	15761		
6838.00	11944				19768	0.454
		23999	2	47998		
6840.00	36053				67766	1.556
			End Area Method:		**67766**	**1.556**
					CU FT	**AC FT**

Design Procedure Form: Extended Detention Basin (EDB) - Sedimentation Facility

Designer: QNA
Company: Terra Nova
Date: June 14, 2007
Project: Dublin North
Location: Temp. west of DP-1A

1. Basin Storage Volume	
A) Tributary Area's Imperviousness Ratio (i = I_a / 100)	I_a = 30.00 % i = 0.30
B) Contributing Watershed Area (Area)	Area = 14.00 acres
C) Water Quality Capture Volume (WQCV) (WQCV =1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I))	WQCV = 0.15 watershed inches
D) Design Volume: Vol = (WQCV / 12) * Area * 1.2	Vol = 0.212 acre-feet
2. Outlet Works	
A) Outlet Type (Check One)	____ Orifice Plate x Perforated Riser Pipe ____ Other: ____
B) Depth at Outlet Above Lowest Perforation (H)	H = 2.00 feet
C) Required Maximum Outlet Area per Row, (A_o)	A_o = 0.45 square inches
D) Perforation Dimensions **(enter one only)**: i) Circular Perforation Diameter **OR** ii) 2" Height Rectangular Perforation Width	D = 0.5000 inches, **OR** W = ____ inches
E) Number of Columns (nc, See Table 6a-1 For Maximum)	nc = 2 number
F) Actual Design Outlet Area per Row (A_o)	A_o = 0.39 square inches
G) Number of Rows (nr)	nr = 6 number
H) Total Outlet Area (A_{ot})	A_{ot} = 2.36 square inches
3. Trash Rack	
A) Needed Open Area: A_t = 0.5 * (Figure 7 Value) * A_{ot}	A_t = 85 square inches
B) Type of Outlet Opening (Check One)	X ≤ 2" Diameter **Round** ____ 2" High **Rectangular** ____ Other: ____
C) For 2", or Smaller, **Round Opening** (Ref.: Figure 6a):	
i) Width of Trash Rack and Concrete Opening (W_{conc}) from Table 6a-1	W_{conc} = 6 inches
ii) Height of Trash Rack Screen (H_{TR})	H_{TR} = 48 inches

HYDRAULIC CALCULATIONS

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Pipe Routing Summary)
DEVELOPED CONDITIONS

Pipe Runs(s)	Contributing Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow	
					I_5	I_{100}	Q_5	Q_{100}
1	DP-1A	3.50	4.09	19.9	3.1	5.1	10.7	20.8
2	DP-1A & 1B	7.01	8.18	19.9	3.1	5.1	21.4	41.7
3	DP-1D & PR-2	10.11	11.81	19.9	3.1	5.1	30.9	60.2
4	DP-1E & PR-3	10.73	12.53	19.9	3.1	5.1	32.8	63.9
5	DP-1F PICK UP	0.71	0.62	11.9	3.8	6.6	2.7	4.1
6	PR-4 & PR-5	11.44	13.15	19.9	3.1	5.1	34.9	67.0
7	DP-3A	0.28	0.32	6.2	4.7	8.5	1.3	2.7
8	DP-3A & 3B	0.46	0.54	9.8	4.1	7.1	1.9	3.8
9	DP-3C	0.28	0.33	7.8	4.4	7.8	1.2	2.6
10	DP-3D	0.34	0.39	6.8	4.6	8.2	1.5	3.2
11	DP-3D & 3E	0.80	0.93	9.2	4.2	7.3	3.3	6.8
12	DP-3A THRU DP-3E	1.54	1.79	9.8	4.1	7.1	6.3	12.8
13	DP-3F DIV BY 2	0.91	1.06	10.3	4.0	7.0	3.6	7.4
14	DP-3F DIV BY 2	0.91	1.06	10.3	4.0	7.0	3.6	7.4
15	DP-3F	1.81	2.11	10.3	4.0	7.0	7.3	14.8
16	DP-3A THRU DP-3G	3.40	3.97	10.3	4.0	7.0	13.7	27.7

DUBLIN NORTH SUBDIVISION
MDDP/FILING 1 FINAL DRAINAGE REPORT
(Pipe Routing Summary)

Pipe Runs(s)	Contributing Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow	
					I_5	I_{100}	Q_5	Q_{100}
17	DP-3H	0.98	1.14	9.2	4.2	7.3	**4.1**	**8.4**
18	DP-3I	0.14	0.17	10.6	4.0	6.9	**0.6**	**1.1**
19	DP-3H & DP-3I	1.12	1.31	10.6	4.0	6.9	**4.5**	**9.0**
20	DP-3A THRU DP-3I	4.52	5.27	10.6	4.0	6.9	**18.0**	**36.4**
21	DP-3J	0.05	0.06	8.9	4.2	7.4	**0.2**	**0.4**
22	DP-3A THRU DP-3J	4.57	5.33	10.6	4.0	6.9	**18.2**	**36.8**
23	DP-3A THRU DP-3K	5.46	6.37	12.5	3.7	6.4	**20.4**	**40.9**
24	DP-3A THRU DP-3M	6.00	7.00	12.5	3.7	6.4	**22.4**	**44.9**
25	DP-6 AND DP-7	4.82	5.63	16.0	3.4	5.7	**16.3**	**32.1**

Calculated by: QNA
Date: 7/25/06
Checked by: _____

DUBLIN NORTH SUBDIVISION
POND EMERGENCY OVERFLOW SPILLWAYS

Pond 1

The general form of the equation for horizontal crested weirs is $Q = CLH^{3/2}$ where:

Q = Weir flow discharge (cfs)	**88.20**
C = Weir flow coefficient	3.4
H = Depth of flow over the weir (ft)	1.00
L = Length of the weir (ft)	25.9

Pond 2

The general form of the equation for horizontal crested weirs is $Q = CLH^{3/2}$ where:

Q = Weir flow discharge (cfs)	**44.90**
C = Weir flow coefficient	3.4
H = Depth of flow over the weir (ft)	0.50
L = Length of the weir (ft)	37.4

DESIGN POINT 1A

Total Flow: Q_5 = **10.7** cfs
Q_{100} = **20.8** cfs
FLOW ASSUMED SPLIT BETWEEN DP-1A AND DP-1B

Maximum allowable ponding depth at sump:

D_5 = 0.45
D_{100} = 0.83 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event: **6** foot inlet required

100-Year Event: **6** foot inlet required

(Install a 10' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at design points 1A & 1B.)

Calculated by: QNA
Date: 4/3/06
Checked by: _____

DESIGN POINT 1B

Total Flow:

Q_5 = **10.7** cfs

Q_{100} = **20.8** cfs

FLOW ASSUMED SPLIT BETWEEN DP-1A AND DP-1B

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.83 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **6** foot inlet required

100-Year Event: **6** foot inlet required

(Install a 10' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at design points 1A & 1B.)

Calculated by: QNA

Date: 4/3/06

Checked by: _____

DESIGN POINT 1D

Total Flow:

Q_5 = **10.6** cfs

Q_{100} = **21.1** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.83 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **6** foot inlet required

100-Year Event: **6** foot inlet required

(Install a 10' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: QNA

Date: 4/3/06

Checked by: _____

DESIGN POINT 1E

Total Flow:

Q_5 = **2.2** cfs

Q_{100} = **4.4** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.67 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: QNA

Date: 4/3/06

Checked by: _____

DESIGN POINT 1F

5-YR FLOW					
Q(5)	2.9	I(5)	3.8		
DEPTH	0.25	Fr	2.47	Inlet size ? L(i) =	**20**
SPREAD	11.1	L(1)	21.1	If Li < L(2) then Qi =	2.7
CROSS SLOPE	2.0%	L(2)	12.7	If Li > L(2) then Qi =	2.1
STREET SLOPE	4.0%	L(3)	45.3	FB =	0.8
				CA(eqv.)=	0.21

100-YR FLOW					
Q(100)	5.7	I(100)	6.6		
DEPTH	0.31	Fr	2.59	Inlet size ? L(i) =	**20**
SPREAD	14.1	L(1)	28.1	If Li < L(2) then Qi =	4.1
CROSS SLOPE	2.0%	L(2)	16.9	If Li > L(2) then Qi =	3.7
STREET SLOPE	4.0%	L(3)	60.3	FB =	2.0
				CA(eqv.)=	0.31

Design Point 3A

Equation 7-2 $Q = \frac{3 \times P \times d^{1.5}}{F}$

Maxium Ponding Depth (d) =	[redacted]	ft
Discharge (Q) =	[redacted]	cfs
Clogging Factor (F) =	[redacted]	
Grate perimeter (P) =	**5.15**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.82** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **1.29** ft

Install a Type 13 inlet
at this design point.

Design Point 3B

Equation 7-2 $Q = \frac{3 \times P \times d^{1.5}}{F}$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	1.2	cfs
Clogging Factor (F) =	0.2	
Grate perimeter (P) =	**2.89**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.46** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.72** ft

Install a Type 13 inlet
at this design point.

Design Point 3C

Equation 7-2 $Q = \frac{3 \times P \times d^{1.5}}{F}$

Maxium Ponding Depth (d) =	[redacted]	ft
Discharge (Q) =	[redacted]	cfs
Clogging Factor (F) =	[redacted]	
Grate perimeter (P) =	**4.82**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.77** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **1.20** ft

Install a Type 13 inlet
at this design point.

Design Point 3D

Equation 7-2 $Q = \frac{3 \times P \times d^{1.5}}{F}$

Maxium Ponding Depth (d) =	[redacted]	ft
Discharge (Q) =	[redacted]	cfs
Clogging Factor (F) =	[redacted]	
Grate perimeter (P) =	**6.07**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.97** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **1.52** ft

Install a Type 13 inlet
at this design point.

Design Point 3E

Equation 7-2 $Q = \frac{3 \times P \times d^{1.5}}{F}$

Maxium Ponding Depth (d) =	[illegible]	ft
Discharge (Q) =	[illegible]	cfs
Clogging Factor (F) =	[illegible]	
Grate perimeter (P) =	**7.38**	ft

Circular Grate Inlet

Diameter (D) **D =** **1.17** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **1.85** ft

Install a Type 13 inlet
at this design point.

DESIGN POINT 3F

Total Flow: Q_5 = **3.6** cfs — FLOW ASSUMED SPLIT BETWEEN 2 INLETS

Q_{100} = **7.4** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.83 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install 2 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point on both sides of street.)

Calculated by: QNA

Date: 4/3/06

Checked by: _____

Design Point 3G

Equation 7-2 $Q = \frac{3 \times P \times d^{1.5}}{F}$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	0.4	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**0.83**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.13** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.21** ft

Install a Type 13 inlet
at this design point.

DESIGN POINT 3H

Total Flow:

Q_5 = **4.1** cfs

Q_{100} = **8.4** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.83 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: QNA

Date: 4/3/06

Checked by: _____

DESIGN POINT 3I

Total Flow: Q_5 = **0.6** cfs

Q_{100} = **1.1** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.83 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: QNA

Date: 4/3/06

Checked by: _____

DESIGN POINT 3H

Total Flow:

Q_5 = **4.1** cfs

Q_{100} = **8.4** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.83 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: QNA

Date: 4/3/06

Checked by: _____

PIPERUN 1
100 YEAR

Project Description	
Worksheet	Piperun 1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	1.00	%
Diameter	24	in
Discharge	20.80	cfs

Results		
Depth	1.51	ft
Flow Area	2.5	ft²
Wetted Perimeter	4.21	ft
Top Width	1.72	ft
Critical Depth	1.64	ft
Percent Full	75.5	%
Critical Slope	0.85	%
Velocity	8.17	ft/s
Velocity Head	1.04	ft
Specific Energy	2.55	ft
Froude Number	1.18	
Maximum Discharge	24.33	cfs
Discharge Full	22.62	cfs
Slope Full	0.85	%
Flow Type	Supercritical	

PIPERUN 2
100 YEAR

Project Description	
Worksheet	Piperun 2
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	1.48	%
Diameter	30	in
Discharge	41.70	cfs

Results		
Depth	1.75	ft
Flow Area	3.7	ft²
Wetted Perimeter	4.95	ft
Top Width	2.29	ft
Critical Depth	2.16	ft
Percent Full	69.9	%
Critical Slope	0.95	%
Velocity	11.38	ft/s
Velocity Head	2.01	ft
Specific Energy	3.76	ft
Froude Number	1.59	
Maximum Discharge	53.67	cfs
Discharge Full	49.90	cfs
Slope Full	1.03	%
Flow Type	Supercritical	

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Swale 1
Section A-A
100-year

Project Description	
Worksheet	SWALE-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	1.00	%
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	2.00	ft
Discharge	23.50	cfs

Results		
Depth	1.06	ft
Flow Area	6.6	ft²
Wetted Perimeter	10.71	ft
Top Width	10.45	ft
Critical Depth	0.95	ft
Critical Slope	1.63	%
Velocity	3.58	ft/s
Velocity Head	0.20	ft
Specific Energy	1.25	ft
Froude Number	0.80	
Flow Type	Subcritical	

PIPERUN 3
100 YEAR

Project Description	
Worksheet	Piperun 3
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	1.48	%
Diameter	36	in
Discharge	60.20	cfs

Results		
Depth	1.92	ft
Flow Area	4.8	ft²
Wetted Perimeter	5.57	ft
Top Width	2.88	ft
Critical Depth	2.51	ft
Percent Full	64.1	%
Critical Slope	0.79	%
Velocity	12.57	ft/s
Velocity Head	2.46	ft
Specific Energy	4.38	ft
Froude Number	1.72	
Maximum Discharge	87.28	cfs
Discharge Full	81.14	cfs
Slope Full	0.81	%
Flow Type	Supercritical	

PIPE RUN 4
100 YEAR

Project Description	
Worksheet	Piperun 4
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	4.52	%
Diameter	36	in
Discharge	63.90	cfs

Results		
Depth	1.41	ft
Flow Area	3.3	ft²
Wetted Perimeter	4.54	ft
Top Width	2.99	ft
Critical Depth	2.57	ft
Percent Full	47.1	%
Critical Slope	0.86	%
Velocity	19.54	ft/s
Velocity Head	5.93	ft
Specific Energy	7.34	ft
Froude Number	3.30	
Maximum Discharge	152.53	cfs
Discharge Full	141.79	cfs
Slope Full	0.92	%
Flow Type	Supercritical	

PIPERUN 5
100 YEAR

Project Description	
Worksheet	Piperun 5
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	4.10	%
Diameter	18	in
Discharge	4.10	cfs

Results		
Depth	0.45	ft
Flow Area	0.4	ft^2
Wetted Perimeter	1.73	ft
Top Width	1.37	ft
Critical Depth	0.78	ft
Percent Full	29.8	%
Critical Slope	0.54	%
Velocity	9.30	ft/s
Velocity Head	1.34	ft
Specific Energy	1.79	ft
Froude Number	2.89	
Maximum Discharge	22.88	cfs
Discharge Full	21.27	cfs
Slope Full	0.15	%
Flow Type	Supercritical	

PIPERUN 6
100 YEAR

Project Description	
Worksheet	Piperun 6
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	0.50	%
Diameter	42	in
Discharge	67.00	cfs

Results		
Depth	2.70	ft
Flow Area	8.0	ft²
Wetted Perimeter	7.51	ft
Top Width	2.94	ft
Critical Depth	2.57	ft
Percent Full	77.2	%
Critical Slope	0.56	%
Velocity	8.41	ft/s
Velocity Head	1.10	ft
Specific Energy	3.80	ft
Froude Number	0.90	
Maximum Discharge	76.52	cfs
Discharge Full	71.14	cfs
Slope Full	0.44	%
Flow Type	Subcritical	

Pipe Run 7
100-year

Project Description	
Worksheet	Piperun 7
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	18	in
Discharge	2.70	cfs

Results		
Slope	0.07	%
Depth	1.50	ft
Flow Area	1.8	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	0.62	ft
Percent Full	100.0	%
Critical Slope	0.51	%
Velocity	1.53	ft/s
Velocity Head	0.04	ft
Specific Energy	1.54	ft
Froude Number	0.00	
Maximum Discharge	2.90	cfs
Discharge Full	2.70	cfs
Slope Full	0.07	%
Flow Type	N/A	

Pipe Run 8
100-year

Project Description	
Worksheet	Piperun 8
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	18	in
Discharge	3.80	cfs

Results		
Slope	0.13	%
Depth	1.50	ft
Flow Area	1.8	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	0.75	ft
Percent Full	100.0	%
Critical Slope	0.53	%
Velocity	2.15	ft/s
Velocity Head	0.07	ft
Specific Energy	1.57	ft
Froude Number	0.00	
Maximum Discharge	4.09	cfs
Discharge Full	3.80	cfs
Slope Full	0.13	%
Flow Type	N/A	

Pipe Run 9
100-year

Project Description	
Worksheet	Piperun 9
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	18	in
Discharge	2.60	cfs

Results		
Slope	0.06	%
Depth	1.50	ft
Flow Area	1.8	ft^2
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	0.61	ft
Percent Full	100.0	%
Critical Slope	0.50	%
Velocity	1.47	ft/s
Velocity Head	0.03	ft
Specific Energy	1.53	ft
Froude Number	0.00	
Maximum Discharge	2.80	cfs
Discharge Full	2.60	cfs
Slope Full	0.06	%
Flow Type	N/A	

Pipe Run 10
100-year

Project Description	
Worksheet	Piperun 10
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	18	in
Discharge	3.20	cfs

Results		
Slope	0.09	%
Depth	1.50	ft
Flow Area	1.8	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	0.68	ft
Percent Full	100.0	%
Critical Slope	0.52	%
Velocity	1.81	ft/s
Velocity Head	0.05	ft
Specific Energy	1.55	ft
Froude Number	0.00	
Maximum Discharge	3.44	cfs
Discharge Full	3.20	cfs
Slope Full	0.09	%
Flow Type	N/A	

Pipe Run 11
100-year

Project Description	
Worksheet	Piperun 11
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.013	
Slope	0.42	%
Diameter	18	in

Results		
Depth	1.50	ft
Discharge	6.80	cfs
Flow Area	1.8	ft^2
Wetted Perimeter	4.71	ft
Top Width	0.00	ft
Critical Depth	1.01	ft
Percent Full	100.0	%
Critical Slope	0.66	%
Velocity	3.85	ft/s
Velocity Head	0.23	ft
Specific Energy	1.73	ft
Froude Number	0.00	
Maximum Discharge	7.31	cfs
Discharge Full	6.80	cfs
Slope Full	0.42	%
Flow Type	N/A	

Pipe Run 12
100-year

Project Description	
Worksheet	Piperun 12
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	24	in
Discharge	12.80	cfs

Results		
Slope	0.32	%
Depth	2.00	ft
Flow Area	3.1	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.58	%
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.77	cfs
Discharge Full	12.80	cfs
Slope Full	0.32	%
Flow Type	N/A	

Pipe Run 13 & 14
100-year

Project Description	
Worksheet	Piperun 13 & 14
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	18	in
Discharge	7.40	cfs

Results		
Slope	0.50	%
Depth	1.50	ft
Flow Area	1.8	ft^2
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	1.05	ft
Percent Full	100.0	%
Critical Slope	0.70	%
Velocity	4.19	ft/s
Velocity Head	0.27	ft
Specific Energy	1.77	ft
Froude Number	0.00	
Maximum Discharge	7.96	cfs
Discharge Full	7.40	cfs
Slope Full	0.50	%
Flow Type	N/A	

Pipe Run 15
100-year

Project Description	
Worksheet	Piperun 15
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	24	in
Discharge	14.80	cfs

Results		
Slope	0.43	%
Depth	2.00	ft
Flow Area	3.1	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	1.39	ft
Percent Full	100.0	%
Critical Slope	0.63	%
Velocity	4.71	ft/s
Velocity Head	0.34	ft
Specific Energy	2.34	ft
Froude Number	0.00	
Maximum Discharge	15.92	cfs
Discharge Full	14.80	cfs
Slope Full	0.43	%
Flow Type	N/A	

PIPERUN 16
100 YEAR

Project Description	
Worksheet	Piperun 16
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	3.00	%
Diameter	30	in
Discharge	27.70	cfs

Results		
Depth	1.08	ft
Flow Area	2.0	ft²
Wetted Perimeter	3.59	ft
Top Width	2.48	ft
Critical Depth	1.79	ft
Percent Full	43.4	%
Critical Slope	0.61	%
Velocity	13.57	ft/s
Velocity Head	2.86	ft
Specific Energy	3.95	ft
Froude Number	2.64	
Maximum Discharge	76.42	cfs
Discharge Full	71.04	cfs
Slope Full	0.46	%
Flow Type	Supercritical	

PIPERUN 17
100 YEAR

Project Description	
Worksheet	Piperun 17
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	1.08	%
Diameter	18	in
Discharge	8.40	cfs

Results		
Depth	0.99	ft
Flow Area	1.2	ft²
Wetted Perimeter	2.84	ft
Top Width	1.42	ft
Critical Depth	1.12	ft
Percent Full	65.8	%
Critical Slope	0.77	%
Velocity	6.81	ft/s
Velocity Head	0.72	ft
Specific Energy	1.71	ft
Froude Number	1.29	
Maximum Discharge	11.74	cfs
Discharge Full	10.92	cfs
Slope Full	0.64	%
Flow Type	Supercritical	

PIPERUN 18
100 YEAR

Project Description	
Worksheet	Piperun 18
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	0.71	%
Diameter	18	in
Discharge	1.10	cfs

Results		
Depth	0.36	ft
Flow Area	0.3	ft²
Wetted Perimeter	1.53	ft
Top Width	1.28	ft
Critical Depth	0.39	ft
Percent Full	23.8	%
Critical Slope	0.49	%
Velocity	3.41	ft/s
Velocity Head	0.18	ft
Specific Energy	0.54	ft
Froude Number	1.20	
Maximum Discharge	9.52	cfs
Discharge Full	8.85	cfs
Slope Full	0.01	%
Flow Type	Supercritical	

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PIPERUN 19
100 YEAR

Project Description	
Worksheet	Piperun 19
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	1.00	%
Diameter	18	in
Discharge	9.00	cfs

Results		
Depth	1.07	ft
Flow Area	1.3	ft^2
Wetted Perimeter	3.02	ft
Top Width	1.36	ft
Critical Depth	1.16	ft
Percent Full	71.3	%
Critical Slope	0.82	%
Velocity	6.68	ft/s
Velocity Head	0.69	ft
Specific Energy	1.76	ft
Froude Number	1.18	
Maximum Discharge	11.30	cfs
Discharge Full	10.50	cfs
Slope Full	0.73	%
Flow Type	Supercritical	

PIPERUN 20
100 YEAR

Project Description	
Worksheet	Piperun 20
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	2.48	%
Diameter	30	in
Discharge	36.40	cfs

Results		
Depth	1.34	ft
Flow Area	2.7	ft²
Wetted Perimeter	4.11	ft
Top Width	2.49	ft
Critical Depth	2.05	ft
Percent Full	53.7	%
Critical Slope	0.79	%
Velocity	13.55	ft/s
Velocity Head	2.85	ft
Specific Energy	4.20	ft
Froude Number	2.30	
Maximum Discharge	69.48	cfs
Discharge Full	64.59	cfs
Slope Full	0.79	%
Flow Type	Supercritical	

PIPERUN 21
100 YEAR

Project Description	
Worksheet	Piperun 21
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	3.00	%
Diameter	18	in
Discharge	0.40	cfs

Results		
Depth	0.15	ft
Flow Area	0.1	ft²
Wetted Perimeter	0.98	ft
Top Width	0.91	ft
Critical Depth	0.23	ft
Percent Full	10.2	%
Critical Slope	0.53	%
Velocity	4.19	ft/s
Velocity Head	0.27	ft
Specific Energy	0.43	ft
Froude Number	2.28	
Maximum Discharge	19.57	cfs
Discharge Full	18.19	cfs
Slope Full	1.45e-3	%
Flow Type	Supercritical	

PIPERUN 22
100 YEAR

Project Description	
Worksheet	Piperun 22
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	1.63	%
Diameter	30	in
Discharge	36.80	cfs

Results		
Depth	1.55	ft
Flow Area	3.2	ft²
Wetted Perimeter	4.52	ft
Top Width	2.43	ft
Critical Depth	2.06	ft
Percent Full	61.8	%
Critical Slope	0.80	%
Velocity	11.55	ft/s
Velocity Head	2.07	ft
Specific Energy	3.62	ft
Froude Number	1.78	
Maximum Discharge	56.33	cfs
Discharge Full	52.36	cfs
Slope Full	0.81	%
Flow Type	Supercritical	

PIPERUN 23
100 YEAR

Project Description	
Worksheet	Piperun 23
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	2.00	%
Diameter	30	in
Discharge	40.50	cfs

Results		
Depth	1.54	ft
Flow Area	3.2	ft^2
Wetted Perimeter	4.51	ft
Top Width	2.43	ft
Critical Depth	2.14	ft
Percent Full	61.5	%
Critical Slope	0.91	%
Velocity	12.78	ft/s
Velocity Head	2.54	ft
Specific Energy	4.08	ft
Froude Number	1.97	
Maximum Discharge	62.40	cfs
Discharge Full	58.00	cfs
Slope Full	0.98	%
Flow Type	Supercritical	

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POND 1 OUTLET
100 YEAR

Project Description	
Worksheet	Pond 1 outlet
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	0.99	%
Diameter	42	in
Discharge	61.86	cfs

Results		
Depth	1.99	ft
Flow Area	5.6	ft²
Wetted Perimeter	5.98	ft
Top Width	3.47	ft
Critical Depth	2.47	ft
Percent Full	56.9	%
Critical Slope	0.53	%
Velocity	10.95	ft/s
Velocity Head	1.86	ft
Specific Energy	3.85	ft
Froude Number	1.51	
Maximum Discharge	107.68	cfs
Discharge Full	100.10	cfs
Slope Full	0.38	%
Flow Type	Supercritical	

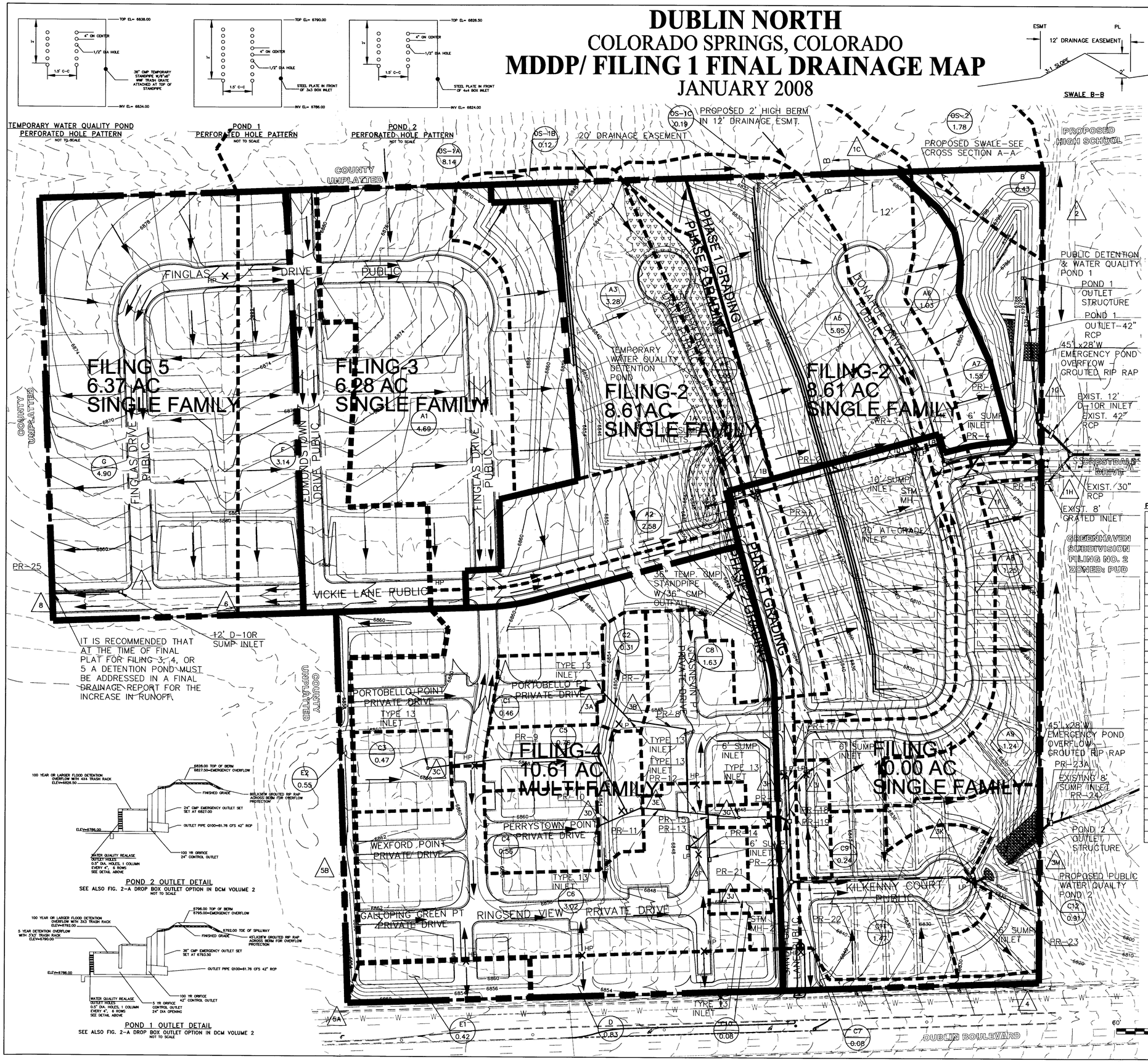
POND 2 OUTLET
100 YEAR

Project Description	
Worksheet	Pond 2 outlet
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	24.77	%
Diameter	24	in
Discharge	40.12	cfs

Results		
Depth	0.82	ft
Flow Area	1.2	ft²
Wetted Perimeter	2.79	ft
Top Width	1.97	ft
Critical Depth	1.95	ft
Percent Full	41.2	%
Critical Slope	2.80	%
Velocity	32.82	ft/s
Velocity Head	16.74	ft
Specific Energy	17.56	ft
Froude Number	7.34	
Maximum Discharge	121.11	cfs
Discharge Full	112.58	cfs
Slope Full	3.15	%
Flow Type	Supercritical	

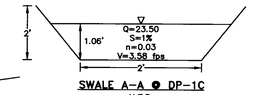
DUBLIN NORTH
COLORADO SPRINGS, COLORADO
MDDP/ FILING 1 FINAL DRAINAGE MAP
JANUARY 2008



POND 2 OUTLET DETAIL
SEE ALSO FIG. 2-A DROP BOX OUTLET OPTION IN DCM VOLUME 2
NOT TO SCALE

POND 1 OUTLET DETAIL
SEE ALSO FIG. 2-A DROP BOX OUTLET OPTION IN DCM VOLUME 2
NOT TO SCALE

SWALE B-B



SWALE A-A @ DP-1C
N.T.S.

PROPOSED BASIN SUMMARY

BASIN	ACRES	Q5 CFS	Q100 CFS
OS-1A	8.14	11.0	23.5
OS-1B	0.12	0.2	0.5
OS-1C	0.19	0.4	0.8
OS-2	1.93	5.0	9.7
A1	4.69	8.6	16.8
A2	2.58	6.5	13.2
A3	3.28	6.4	12.5
A4	1.05	2.3	4.5
A5	5.05	10.6	21.1
A6	1.03	2.2	4.4
A7	1.55	3.5	7.0
A8	1.25	2.9	5.7
A9	1.24	3.6	7.6
B	0.43	0.4	0.9
C1	0.46	1.3	2.7
C2	0.31	0.8	1.5
C3	0.47	1.2	2.6
C4	0.56	1.5	3.2
C5	0.76	1.9	3.9
C6	3.02	7.3	14.8
C7	0.08	0.2	0.4
C8	1.63	4.1	8.4
C9	0.24	0.6	1.1
C10	0.08	0.2	0.4
C11	1.47	3.3	6.6
C12	0.91	2.3	4.8
D	0.83	2.3	4.8
E1	0.42	1.3	2.7
E2	0.55	1.3	2.7
F	3.14	6.6	13.1

PROPOSED DESIGN POINT SUMMARY

DP	Q5 CFS	Q100 CFS
1A	19.5	37.9
1B	2.3	4.5
1A & 1B	21.4	41.7
1C	11.0	23.5
1D	10.9	21.7
1E	2.2	4.4
1F	2.9	5.7
1G	44.7	88.7
1H	4.6	10.3
2	4.5	8.5
3A	1.3	2.7
3B	0.8	1.5
3C	1.2	2.6
3D	1.5	3.2
3E	1.9	3.9
3F	7.3	14.8
3G	0.2	0.4
3H	4.1	8.4
3I	0.6	1.1
3J	0.2	0.4
3K	3.3	6.6
3M	22.4	44.9
4	2.3	4.8
5A	1.3	2.7
5B	1.3	2.7
6	6.6	13.1
7	9.9	19.5
8	16.3	32.1

PROPOSED PIPE RUN SUMMARY

PIPE RUN	SIZE
PR-1	24"
PR-2	30"
PR-3	36"
PR-4	36"
PR-5	18"
PR-6	42"
PR-7	18"
PR-8	18"
PR-9	18"
PR-10	18"
PR-11	18"
PR-12	24"
PR-13	18"
PR-14	18"
PR-15	24"
PR-16	30"
PR-17	18"
PR-18	18"
PR-19	18"
PR-20	30"
PR-21	18"
PR-22	30"
PR-23	30"
PR-24	EXIST. 30"
PR-25	30"
POND 1	42"
POND 2	30"

ALL STORM DRAIN IS RCP

LEGEND

- 10' EX CONTOUR — 6810
- 2' EX CONTOUR — 6802
- 10' PROP. CONTOUR — 6810
- 2' PROP. CONTOUR — 6802
- PROPOSED FLOW DIRECTION
- BASIN BOUNDARY
- TIME OF CONCENTRATION
- BASIN ID — OS-2
- ACREAGE — 0.37
- DESIGN POINT — 3
- TEMPORARY WATER QUALITY POND

NO.	DESCRIPTION	DATE
1	PER CITY COMMENTS	7/31/07
2	PER CITY COMMENTS	1/28/08

REVISIONS

PREPARED FOR:
DUBLIN HOLDINGS GROUP, LLC
ATTN:
25 N. TEJON STREET
COLORADO SPRINGS, CO 80903
(719) 227 1022

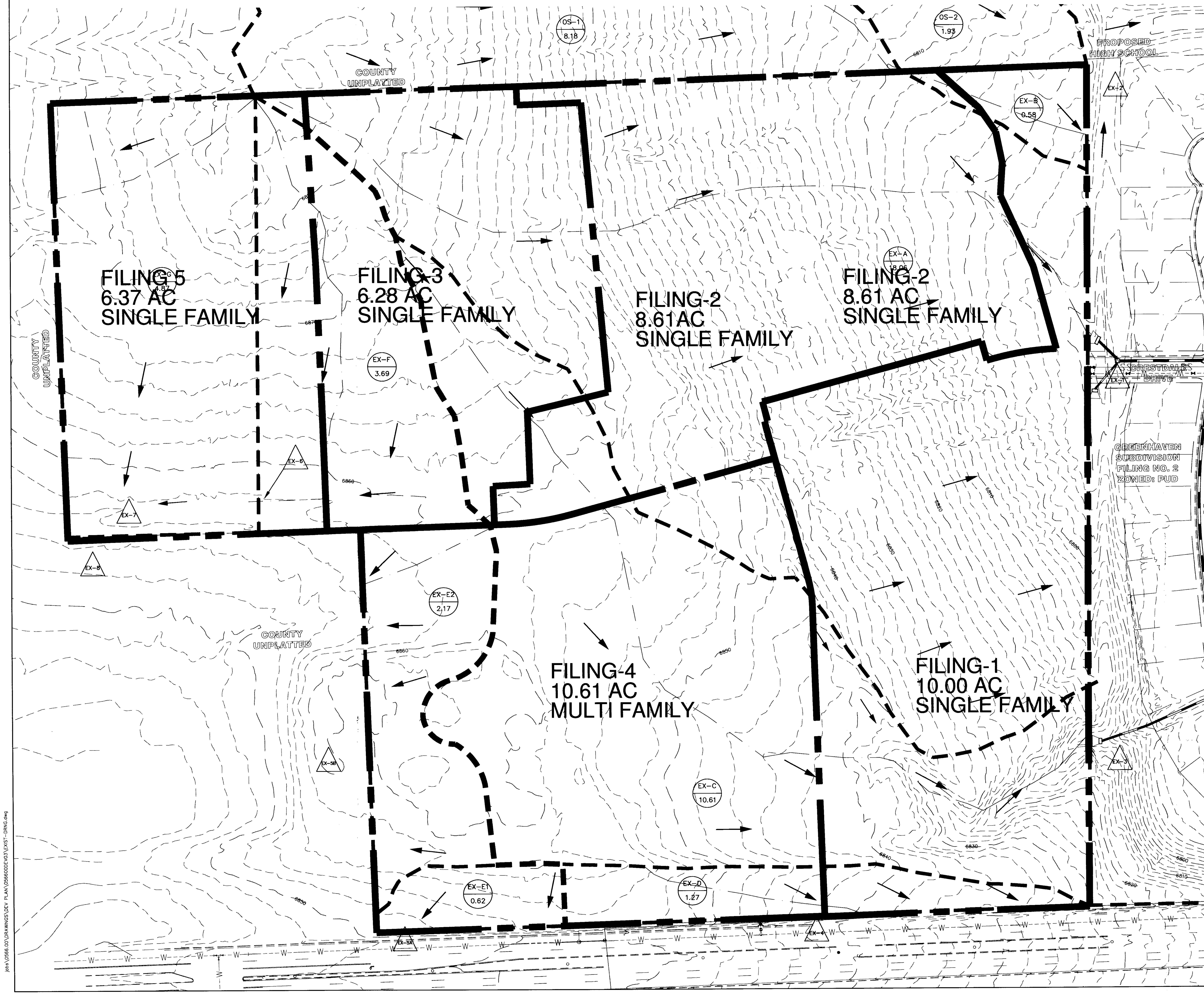
ENTECH ENGINEERING, INC.
Proactive Civil Engineering & Surveying
121 N. WAHSATCH AVE., SUITE 101
COLORADO SPRINGS, CO. 80903
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tnsinc.com

DUBLIN NORTH

MDDP / FILING 1 FINAL DRAINAGE MAP
PROPOSED DRAINAGE MAP

DESIGNED BY	QNA
DRAWN BY	LAE
CHECKED BY	LDR
H-SCALE	1"=60'
V-SCALE	N/A
JOB NO.	0717.00
DATE ISSUED	01/28/08
SHEET NO.	1 OF 1

DUBLIN NORTH
COLORADO SPRINGS, COLORADO
HISTORIC DRAINAGE MAP
JANUARY 2008



EXISTING BASIN SUMMARY

BASIN	ACRES	Q5 CFS	Q100 CFS
OS-1*	8.18	11.1	23.6
OS-2*	1.93	5.4	10.5
EX-A*	18.06	24.6	52.6
EX-B*	0.58	0.8	1.7
EX-C*	10.61	17.7	35.8
EX-D	1.27	1.5	3.3
EX-E1	0.62	0.7	1.6
EX-E2	2.17	2.2	5.1
EX-F	3.69	3.7	8.4
EX-G	4.87	5.5	12.7

* COMPOSITE C INFORMATION TAKEN FROM "MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT NO. II FOR THE EASTERLY PORTION OF RIDGEVIEW SUBDIVISION AND PRELIMINARY DRAINAGE REPORT FOR THE NORTHEASTERLY PORTION OF RIDGEVIEW SUBDIVISION AND PHASE II SAND CREEK CHANNEL IMPROVEMENTS." BASIN OS-1, EX-A & EX-B CORRESPOND TO OS-145-2 FROM MDDP. BASIN EX-C CORRESPONDS TO OS-145-1 FROM MDDP. BASIN OS-2 IS PART OF BASIN OS-145-3 OF THE MDDP.

EXISTING DESIGN POINT SUMMARY

DP	Q5 CFS	Q100 CFS
EX-1	35.5	75.7
EX-2	5.2	9.3
EX-3	17.7	35.8
EX-4	1.5	3.3
EX-5A	0.7	1.6
EX-5B	2.2	5.1
EX-6	3.7	8.4
EX-7	5.5	12.7
EX-8	8.7	19.6

LEGEND

- 10' EX CONTOUR — 6810
- 2' EX CONTOUR — 6802
- PROPOSED FLOW DIRECTION
- BASIN BOUNDARY
- TIME OF CONCENTRATION
- BASIN ID — OS-2
- ACREAGE — 0.37
- DESIGN POINT — 3

N

60' 0 60' 120'

SCALE: 1"=60'

REVISIONS

NO.	DESCRIPTION	DATE
1	PER CITY COMMENTS	6/24/06
2	PER CITY COMMENTS	7/17/06

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING AND SURVEYING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
DUBLIN HOLDINGS GROUP, LLC
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(719) 227 1022

Terra Nova Engineering, Inc.
"Creative Civil Engineering Solutions"
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COLORADO SPRINGS, CO. 80903
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tnesinc.com

DUBLIN NORTH

FINAL DRAINAGE PLAN
HISTORIC DRAINAGE MAP

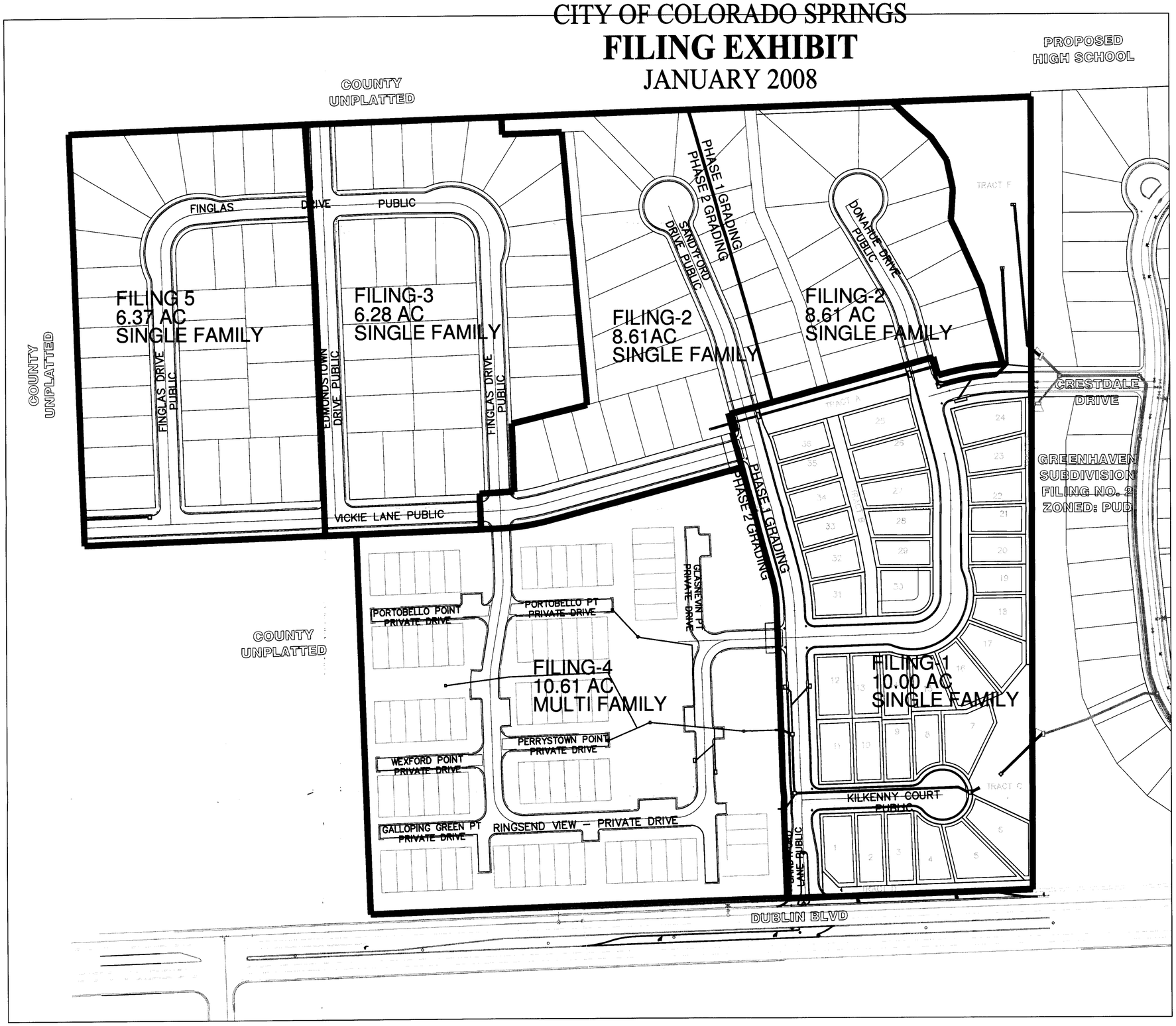
DESIGNED BY	QNA
DRAWN BY	LAE
CHECKED BY	LDR
H-SCALE	1"=60'
V-SCALE	N/A
JOB NO.	0717.00
DATE ISSUED	1/28/08
SHEET NO.	1 OF 1

DUBLIN NORTH

CITY OF COLORADO SPRINGS

FILING EXHIBIT

JANUARY 2008



TRACT USES:

1. THE DUBLIN NORTH HOMEOWNERS ASSOCIATION DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS, WHICH ADDRESS LANDSCAPE MAINTENANCE AND OTHER ITEMS FOR THE HOMEOWNERS ASSOCIATION ARE RECORDED UNDER RECEPTION NO. 208008912 OF THE EL PASO COUNTY CLERK AND RECORDERS OFFICE.

2. TRACT A IS FOR LANDSCAPE, PUBLIC IMPROVEMENTS, DRAINAGE AND PUBLIC UTILITIES PURPOSES AND SHALL BE OWNED BY THE DUBLIN NORTH HOMEOWNERS ASSOCIATION. MAINTENANCE OF LANDSCAPING WILL BE BY THE DUBLIN NORTH HOMEOWNERS ASSOCIATION, MAINTENANCE OF PUBLIC UTILITIES AND DRAINAGE FACILITIES WILL BE BY THE CITY OF COLORADO SPRINGS.

3. TRACTS B AND E ARE FOR LANDSCAPE, PUBLIC IMPROVEMENTS, DRAINAGE AND PUBLIC UTILITIES PURPOSES AND SHALL BE OWNED AND MAINTAINED BY THE DUBLIN NORTH HOMEOWNERS ASSOCIATION.

4. TRACTS C AND F ARE FOR STORMWATER DETENTION, LANDSCAPE, PUBLIC IMPROVEMENTS, AND PUBLIC UTILITIES PURPOSES, AND SHALL BE OWNED BY THE CITY OF COLORADO SPRINGS. MAINTENANCE OF LANDSCAPING WILL BE BY THE DUBLIN NORTH HOMEOWNERS ASSOCIATION. MAINTENANCE OF PUBLIC UTILITIES AND DRAINAGE FACILITIES WILL BE BY CITY OF COLORADO SPRINGS.

5. TRACT D IS FOR LANDSCAPE, PUBLIC IMPROVEMENTS, DRAINAGE AND PUBLIC UTILITIES PURPOSES AND SHALL BE OWNED BY THE CITY OF COLORADO SPRINGS. MAINTENANCE OF LANDSCAPING WILL BE BY THE DUBLIN NORTH HOMEOWNERS ASSOCIATION. MAINTENANCE OF PUBLIC UTILITIES AND DRAINAGE FACILITIES WILL BE BY THE CITY OF COLORADO SPRINGS.

N

80' 0 80' 160'

SCALE: 1"=80'

REVISIONS		
NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE PLANS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
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COLORADO SPRINGS, CO. 80904
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FAX: 719-635-6426
www.tnesinc.com

DUBLIN NORTH

FILING EXHIBIT

DESIGNED BY	QNA
DRAWN BY	QNA
CHECKED BY	
H-SCALE	1"=80'
V-SCALE	NA
JOB NO.	0717.00
DATE ISSUED	01/28/08
SHEET NO.	1 OF 1